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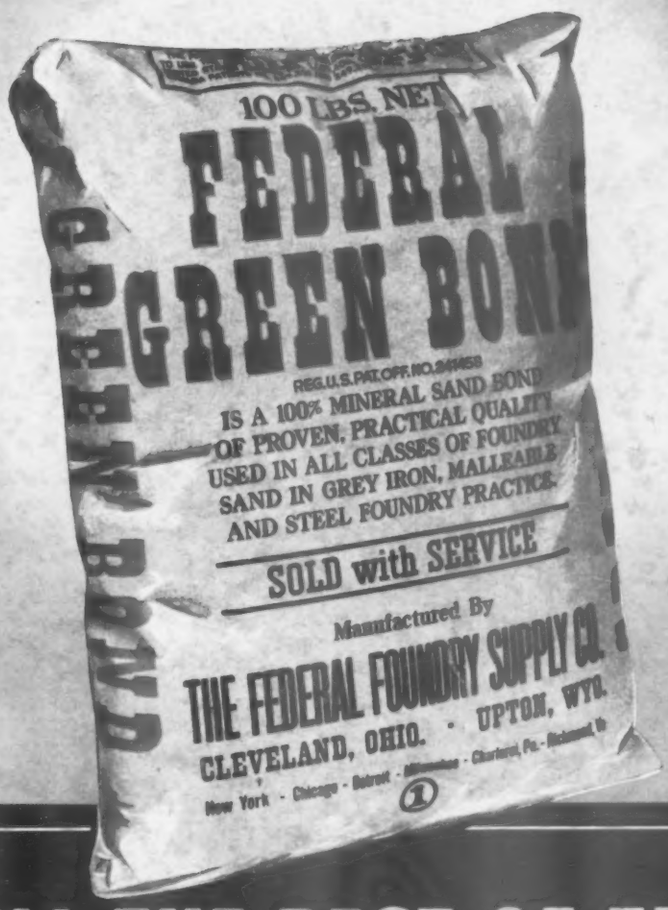
THE FOUNDRY

wherever metals are cast...


100 LBS. NET
FEDERAL
GREEN BOND
REG. U.S. PAT. OFF. NO. 244153
IS A 100% MINERAL SAND BOND
OF PROVEN, PRACTICAL QUALITY
USED IN ALL CLASSES OF FOUNDRY
SAND IN GREY IRON, MALLEABLE
AND STEEL FOUNDRY PRACTICE.
SOLD with SERVICE
Manufactured By
THE FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO. - UPTON, WYO.
New York - Chicago - Detroit - Milwaukee - Charleroi, Pa. - Richmond, Va.
GREEN BOND

STILL THE BEST OF THE BENTONITES

99% pure fused soda ash molded into 2-lb. pigs, PURITE is easy-to-use and effective in action. Pigs are simply added to ladle or cupola by count. No weighing or measuring. No loss or dust. PURITE is safe and economical to use.

SHIPPED IN 100-LB. BAGS AND BULK CARLOADS

IMPROVE STRENGTH and MACHINABILITY OF CASTINGS

For better cupola operations with hotter metal and less oxidation of the iron and metalloids in the charge, use Purite. This scientific flux removes impurities and prevents segregation defects. In both cupola and ladle, Purite increases the fluidity and pouring qualities of the molten metal, speeding production of sounder castings.

Ask your foundry supply house for a copy of Mathieson Bulletin P-41, "Refining and Desulphurizing Cupola Iron with Purite."

PURITE

99% PURE FUSED SODA ASH

THE SCIENTIFIC FLUX FOR BETTER MELTING & CLEANER IRON

Mathieson

CHEMICALS

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
(Licensee of Metallurgical Development Company, Inc.)
In Canada: Railway & Power Engineering Corporation, Limited

a long time since we roped this crane

Yes . . . Quite a long time. So long I'd just about forgotten the make of the rope.

So I said, "It's still in good shape, but I better find out where we bought it. We'll order another for a spare."

I looked it up. It was Purple Strand rope. It had been in service even longer than I figured. That's the brand we'll use on our jobs hereafter—all of 'em.

Bethlehem's Purple Strand is the ideal wire rope for heavy loads. It's built of premium steel, and it's tough . . . long-lasting . . . trustworthy. Buy it for cranes, hoists, and other machines engaged in severe lifting and handling service. It's built in many sizes, but all have the same high quality.

When you think WIRE ROPE

. . . think BETHLEHEM

Crown Hill Seacoal Facing cuts cleaning costs because of its sudden and complete ignition. and because of its low sulphur content . . . . . Blisters, scabs, blow holes, roughened surfaces and other defects tend to vanish when Crown Hill Seacoal Facing is used exclusively.

CROWN HILL MEANS QUALITY SEACOAL

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

IN TWIN CITIES: The Foundry Supply Co., Inc., 2396 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

THE FOUNDRY

for SEPTEMBER 1946

VOLUME 74 NUMBER 9

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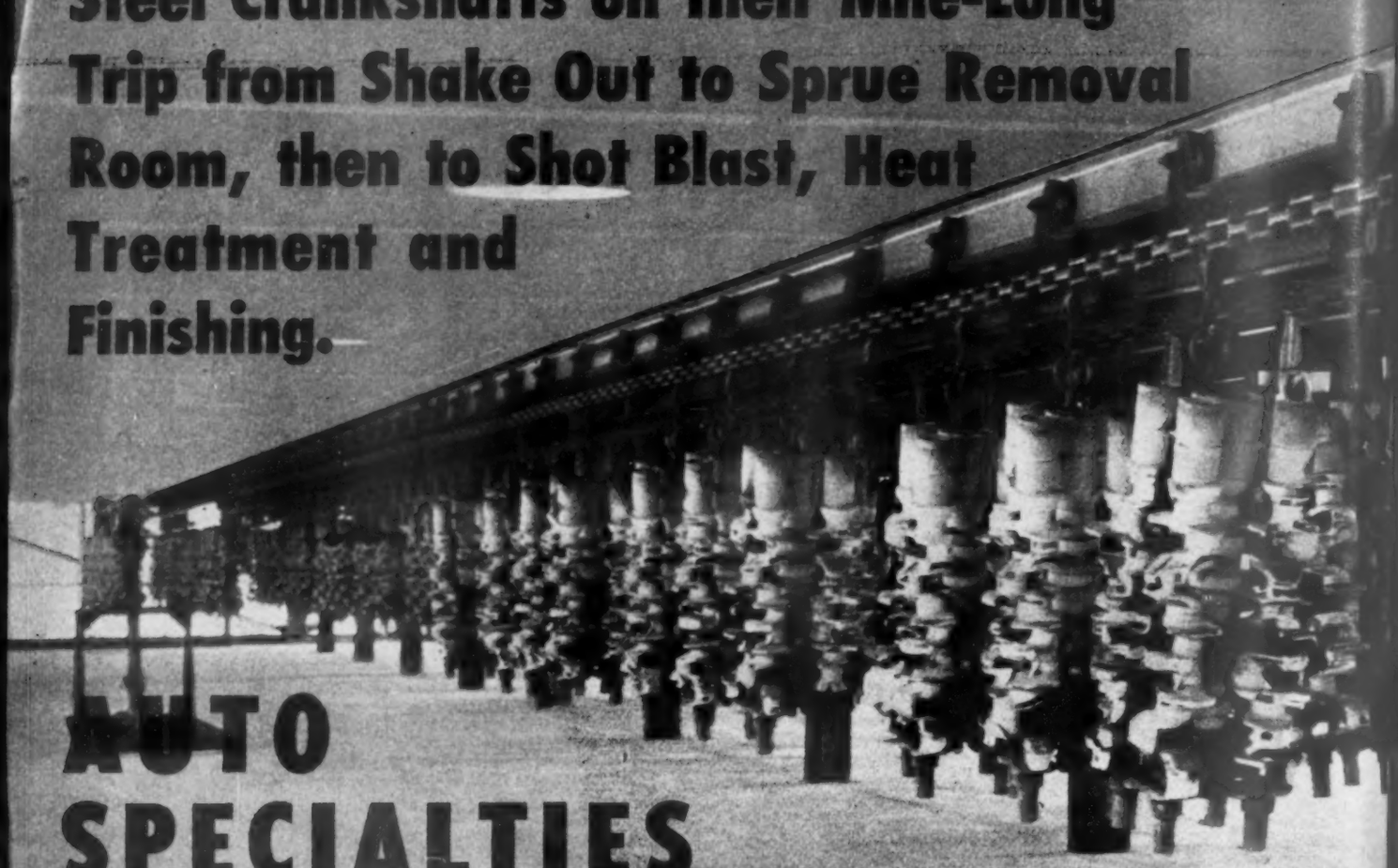
Steel Crankshafts on their Mile-Long Trip from Shake Out to Sprue Removal Room, then to Shot Blast, Heat Treatment and Finishing.



AUTO SPECIALTIES MANUFACTURING CO.

ST. JOSEPH • MICH.

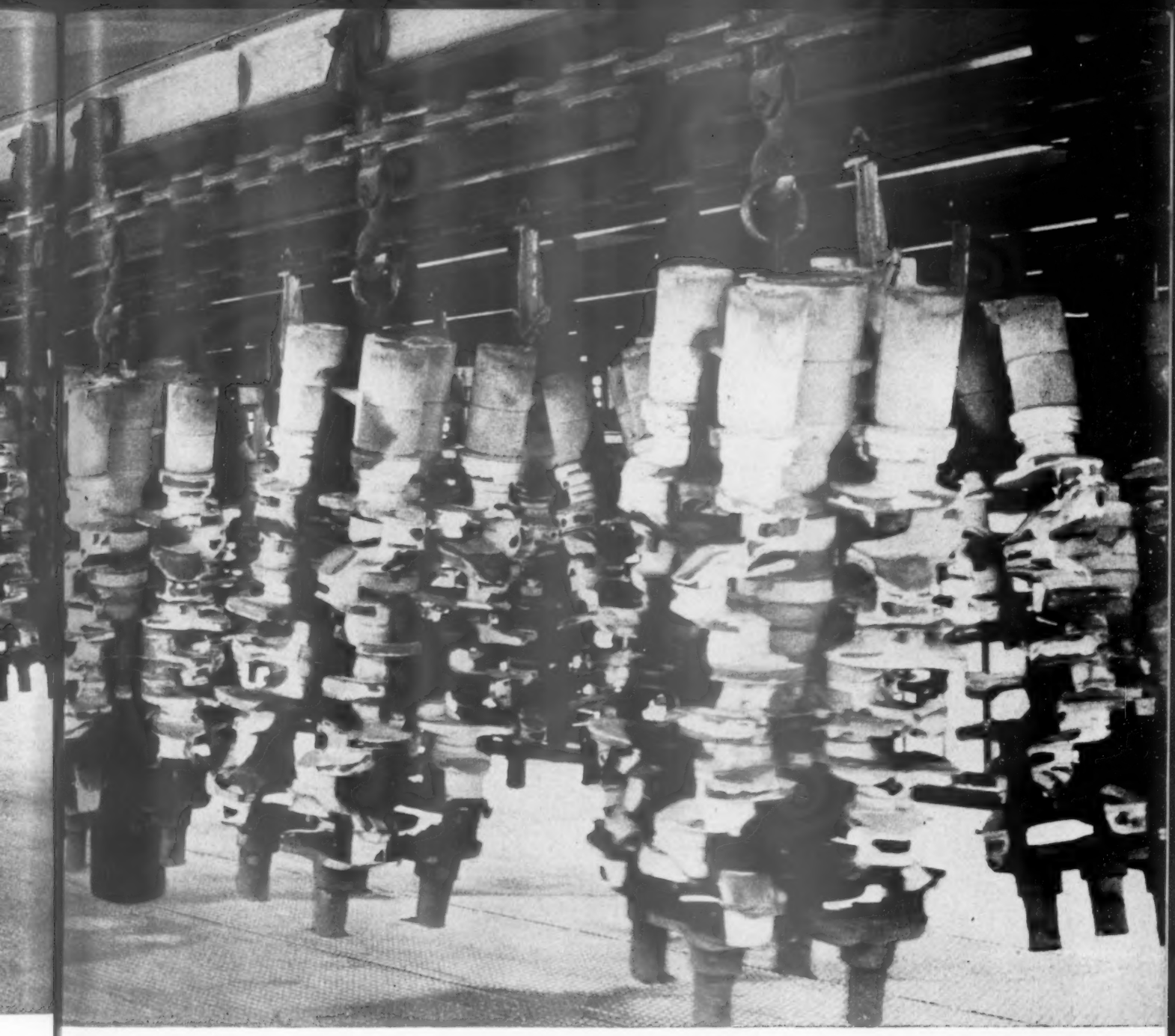
Assembling Linoil Molds for Crankshafts

"In regard to our experience with Linoil and with your company; briefly, over a period of twelve years we have found that it is far better to deal with the company having a reliable reputation and to pay for a high quality oil; rather than take unnecessary chances

THE WERNER G.

(DIVISION OF ARCHER-

2191 WEST 110 STREET WOODBINE



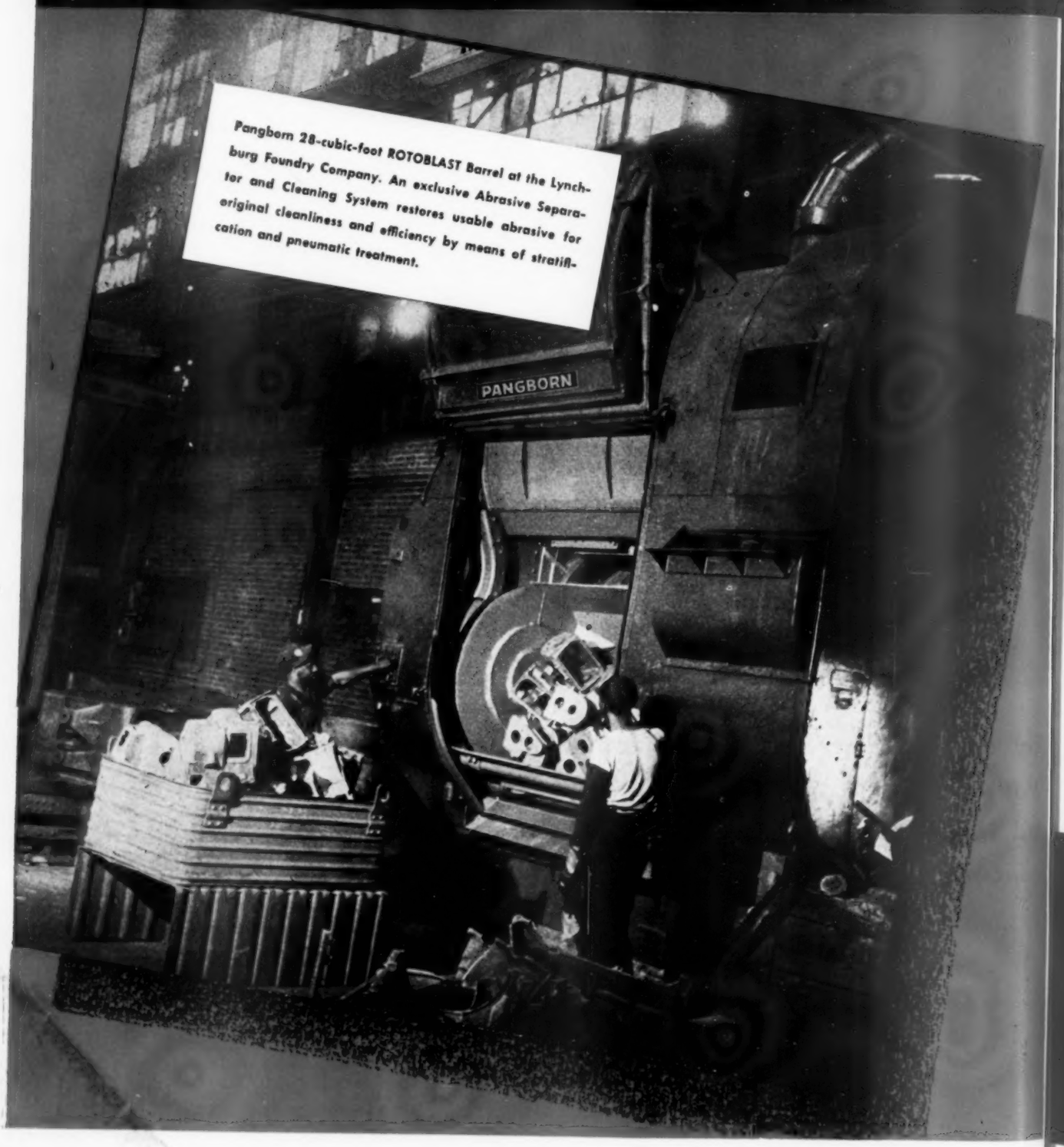
by using cheaper oils. It is permissible to use the statement in your last paragraph about our having used seventy tank cars of oil in the past few years, since we still receive a very high ratio of core sand to a gallon of oil".

— Wm. G. Ferrell,
General Works Superintendent

SMITH COMPANY
DANIELS - MIDLAND COMPANY)
4690 CLEVELAND 2, OHIO

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND



Pangborn 28-cubic-foot ROTOBLAST Barrel at the Lynchburg Foundry Company. An exclusive Abrasive Separator and Cleaning System restores usable abrasive for original cleanliness and efficiency by means of stratification and pneumatic treatment.

TOPS 200-TON-A-DAY MARK

So Lynchburg Foundry "Comes to Pangborn" for 3rd time

When Lynchburg Foundry Company installed a completely new mechanized molding system, they replaced their tumbling mills with Pangborn blast cleaning equipment to make sure that cleaning would keep pace with the high-production molding.

Results have even surpassed expectations. The Pangborn machines (two ROTOBLAST* Airless Barrels and one Pangborn Airblast Room) have achieved production rates as high as 200 tons a day — and *average* 160 tons a day. The quality of cleaning is so high that rejections have dropped and the amount of finishing time per piece is only a fraction of the time formerly required.

So — when still more capacity was needed, Lynchburg Foundry came to Pangborn. A third ROTOBLAST Barrel was recently delivered.

Complete information on the ROTOBLAST method of airless blast cleaning, which saves time, saves breakage, improves quality, facilitates inspection and finishing, is available from Pangborn Corporation, 284-A Pangborn Boulevard, Hagerstown, Maryland — *world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of the Pangborn Corporation.

MORE SPEED . . . AND BETTER WORK. 8 minutes produced the difference in these two pictures. Note the quality of the finish on the parts. Pieces with intricate deep pockets are thoroughly cleaned by ROTOBLAST.

Rotoblast*

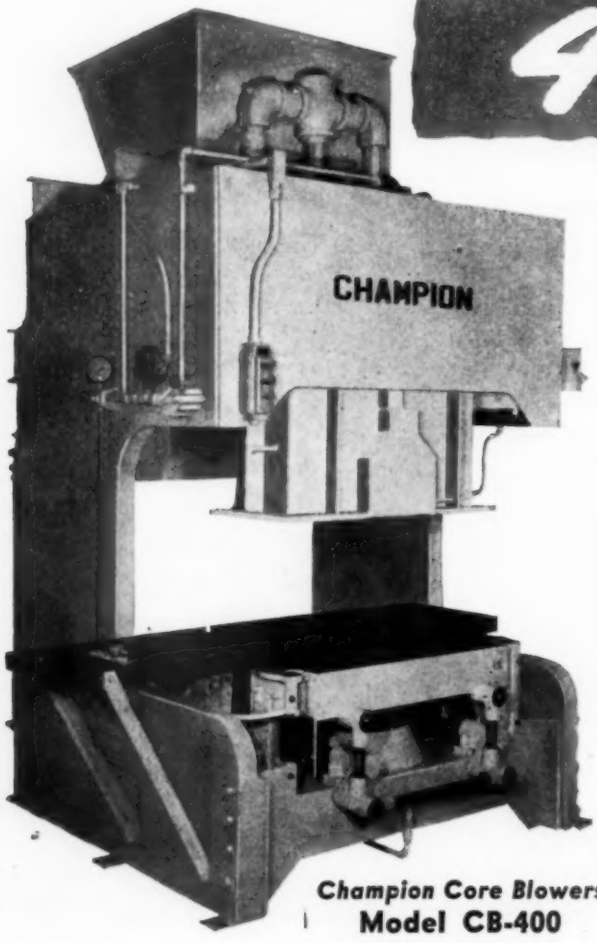
The airless centrifugal unit that propels metal abrasive without crushing, without waste

RECONVERSION MEANS KEENER COMPETITION

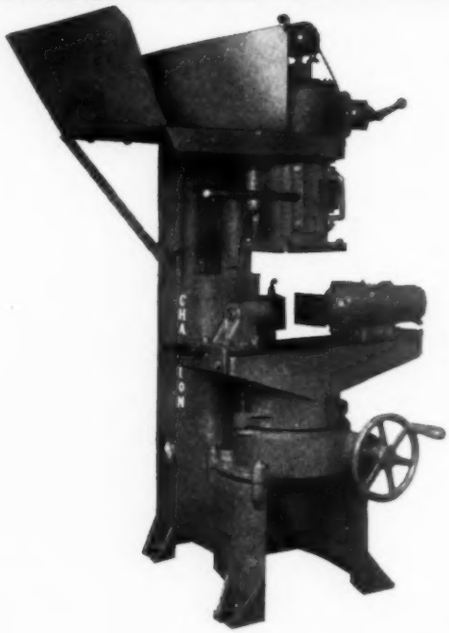
AND .....

DO YOU KNOW HOW TO MEET IT!

4 GREAT ARE READY

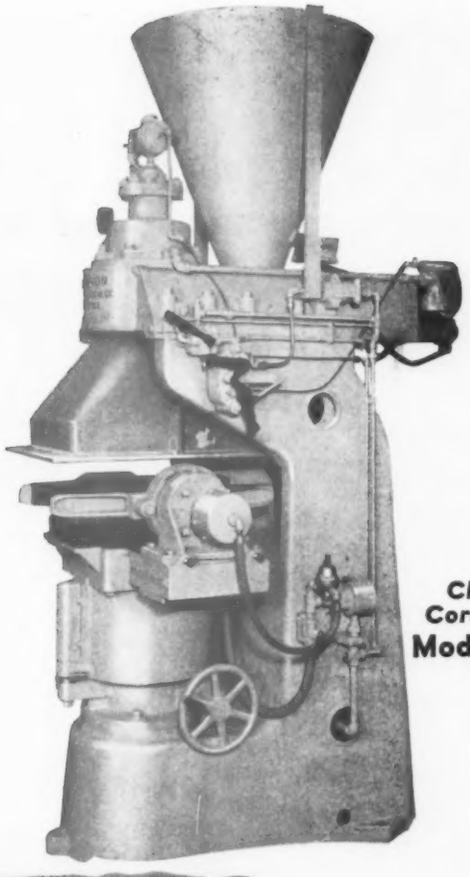


Champion Core Blowers
Model CB-400



Champion Core Blowers
Model CB-10

Champion Core Blowers
Model CB-12



Champion
Core Blowers
Model CB-15

CHAMPIONS MEET THE CHALLENGE

These four great *Champions* are True-Blue Ribbon winners—*Champions* every inch and every pound of them, backed by almost a half century of foundry "know-how." That's why we at *Champion* can guarantee complete satisfaction from every installation. Each model has been tried and proved in many of the world's leading foundries, small and large.

By simply setting the box and pulling the lever, any person without previous experience can produce perfectly rammed cores on a *Champion*. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamp in the proper cycle. Regardless of size or design —small or large, simple or complex cores —the ramming time is identical.

When keener competition comes, stay with the winner, who'll still be *Champion*.

CHAMPION
FOUNDRY & MACHINE CO.

1318 WEST 21st STREET CHICAGO 8, ILLINOIS

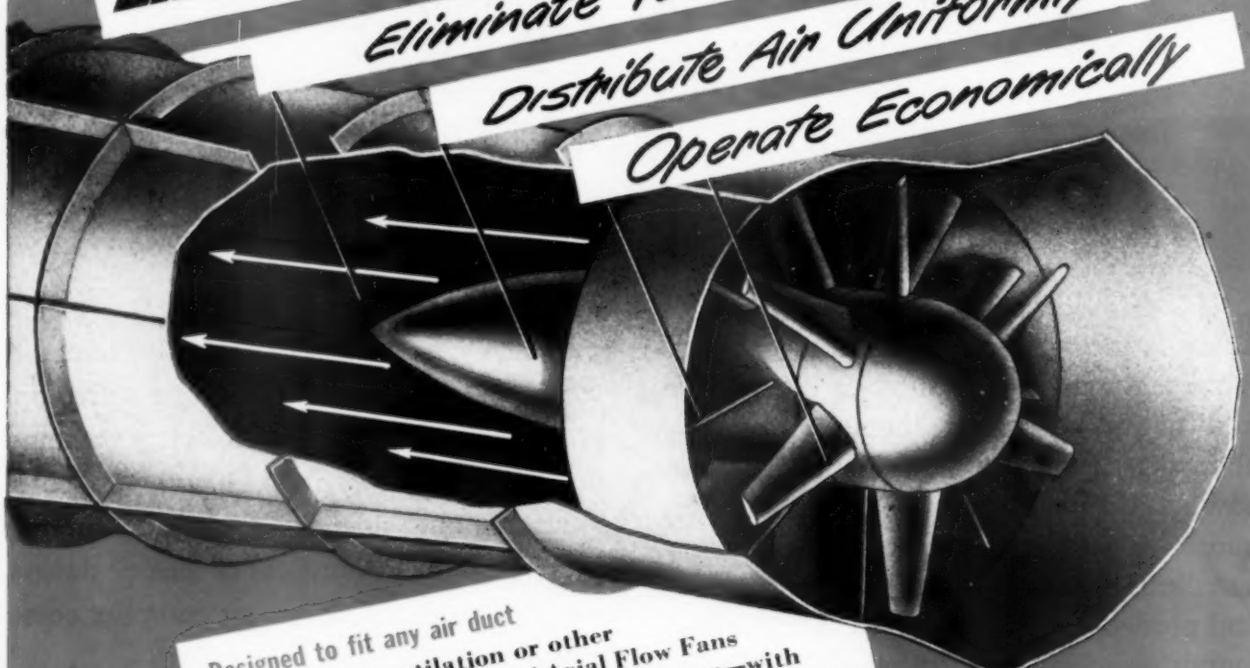
Axial Flow Fans
Guarantee
Efficiency

LA-DEL FANS – Troller Designed

Eliminate Turbulence

Distribute Air Uniformly

Operate Economically



Designed to fit any air duct

What's your ventilation or other air-movement job? La-Del Axial Flow Fans can do it in less space and with less power—with easy, low-cost installation and quiet, trouble-free operation. ● As specialists in Axial Flow Fans, let our engineers check with yours on futures.

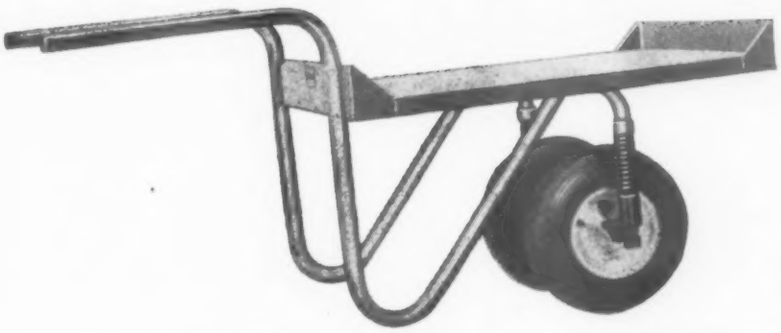
Consult a Joy Engineer

LA-DEL Division

JOY MANUFACTURING CO.

NEW PHILADELPHIA, OHIO

SPEED UP HANDLING!



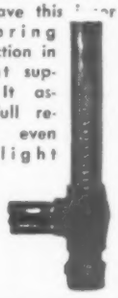
CMD PNEUMATIC CORE BARROW Model C-2

This sturdy two-wheeled core barrow with pneumatic tires and inner springs in the uprights over the wheels (an exclusive CMD feature) speeds up handling heavy loads in the foundry.

and Reduce CORE Breakage

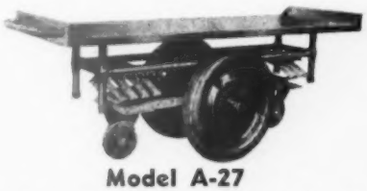
with CMD PNEUMATIC CORE TRUCKS

Only CMD Pneumatic Core Trucks and Barrows have this inner coil spring construction in upright supports. It assures full resiliency even under light loads.



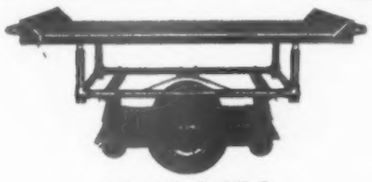
Model C-1

This light-weight easy-to-handle single-wheel pneumatic core barrow simplifies core handling in crowded places.



Model A-27

Big loads can be moved safely and quickly with this truck. Three sizes: 27" x 60"—800 lbs. capacity; 27" x 72"—1,000 lbs. capacity; 27" x 84"—1200 lbs. capacity.

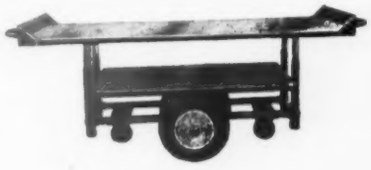


Model A-27-J

Light and heavy loads can be carried with complete safety by the sturdily built Model A-27-J Core Truck. Loading platform is 27" x 60" long. Loading capacity is 600 lbs. Elliptical springs and inner coil springs in the uprights assure correct resiliency.

Model B-1

The resilient chassis of this truck is made of spring steel properly heat-treated and includes intermediate elliptical springs for maximum cushioning protection. The solid rubber tired, steel-spoked wheels have Hyatt Roller Bearings. Load capacity, 700 lbs.



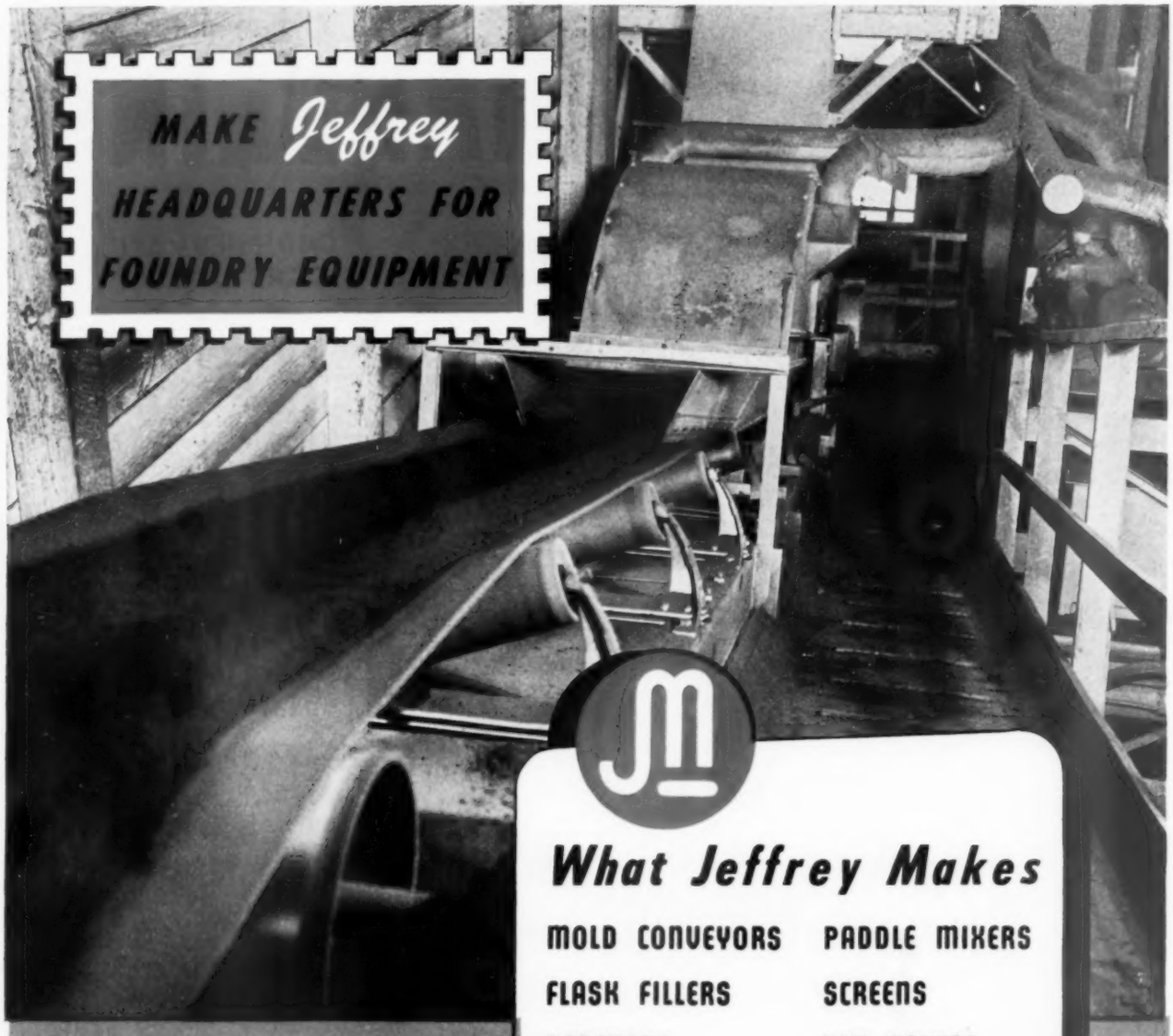
Model D-1

This truck has two loading trays and is sturdily built to give years of service of moderate cost. This truck has CMD inner coil springs in the uprights and has two Pneumatic-tire wheels. It is the outstanding value in moderately priced core trucks. Load capacity 600 lbs.

Write today for catalog on CMD Core Trucks, Core Barrows and other foundry specialties!

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 5F, 1928 West 46th St. · · Chicago 9, Illinois · ·



A Belt Conveyor
Carrying Prepared Sand
From an Aerator

What Jeffrey Makes

MOLD CONVEYORS
PADDLE MIXERS
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BIN VALVES
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ESTABLISHED 1877

Now . . ANOTHER OUTSTANDING DELTA FOUNDRY PRODUCT

BONDITE

LICENSED FOR FOUNDRY USE UNDER U. S. PAT. 2256832

A new organic binder composed of pure hydrocarbon and organic vegetable binders requiring only the removal of water by heat to develop maximum tensile strength and surface hardness.

NOTE THESE IMPORTANT ADVANTAGES IN MOLDING SANDS AND CORES

1. Produces some green strength and can be used as a partial replacement (from 50% to 75%) for cereal binders.
2. Removal of water by heat produces good tensile strength, very high compression and hot strength.
3. To produce the above properties, no chemical reaction takes place thus resulting in stable sand surfaces on which the molten metal lays kindly.
4. The volatile gases produced by decomposition of bondite, ahead of the molten metal are reducing in nature. This helps neutralize free hydrogen, reduces oxidation, eliminates rough casting surfaces, burning-in and metal penetration.
5. Increased hot strength reduces buckling, scabbing, penetration and veining.
6. Prevents surface moisture absorption, becomes waterproof on drying.
7. Withstands high torch heat and over-baking, will not crumble edges of skin dried molds and cores.
8. It is 98% volatile, leaves no excessive ash for sand contamination.
9. Clays, bentonite, silica flour, fines or old sand have a minor effect on its binding properties.
10. It is economical to use, reduces cleaning costs and greatly improves casting surfaces and soundness.

Send for Bulletin No. 104 for complete information.

AN ENTIRELY NEW ORGANIC BINDER FOR SKIN DRY DRY SAND AND GREEN SAND MOLDS & CORES

●

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

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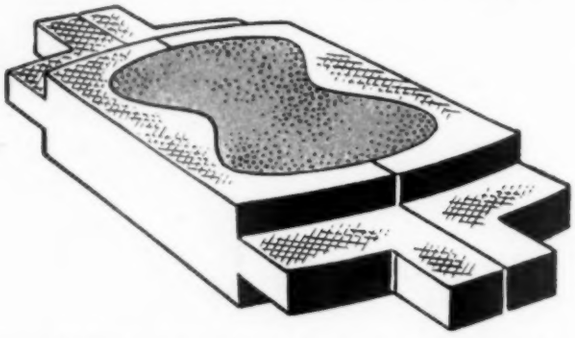
VELSICOL

Coresin oils

give you *more* for your money



Coresin Oils are no higher in price than ordinary oils yet all the advantages of VELSICOL'S scientific and manufacturing skills accrue to make them superior in basic core oil properties. The net result is fewer rejects and actual lower cost per ton of finished castings for users of CORESIN OILS.

★ ***LIGHT COLOR***

This characteristic is exclusive with VELSICOL because only VELSICOL has developed a light color hydrocarbon resin with properties specifically meeting core oil requirements.

★ ***DISCIPLINED STRENGTH***

VELSICOL CORESIN OILS give your cores the strength they need, combined with properly timed collapsibility. They are low in gas evolution, do not stick in core boxes and clean readily.

★ ***UNIFORMITY***

The consistent uniformity of VELSICOL CORESIN OILS is supported by laboratory check for every ingredient incorporated in these oils, and laboratory approval, only when they meet rigid standards of performance demanded of them in the foundry; the result is constant uniformity.

MANUFACTURERS OF CORESIN CORE OILS • INSECT TOXICANTS • SYNTHETIC RESINS • AROMATIC SOLVENTS

VELSICOL Corporation

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RESEARCH—Research is routine in modern smelters such as operated by Federated. Long ago, Federated recognized that research is the mother of progress. The services, the experience, the accumulated knowledge of many scientists and specialists are at the disposal of every Federated plant throughout the country. Their daily work is directed to discovering new refining methods, more accurate analytical methods, testing of products, and the improvement of Federated quality. Here's brains at work for you—your silent partners—helping to put quality into your products. The spectrograph illustrated is only one of many scientific instruments used by our research department.

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Nation-wide service with offices in principal cities

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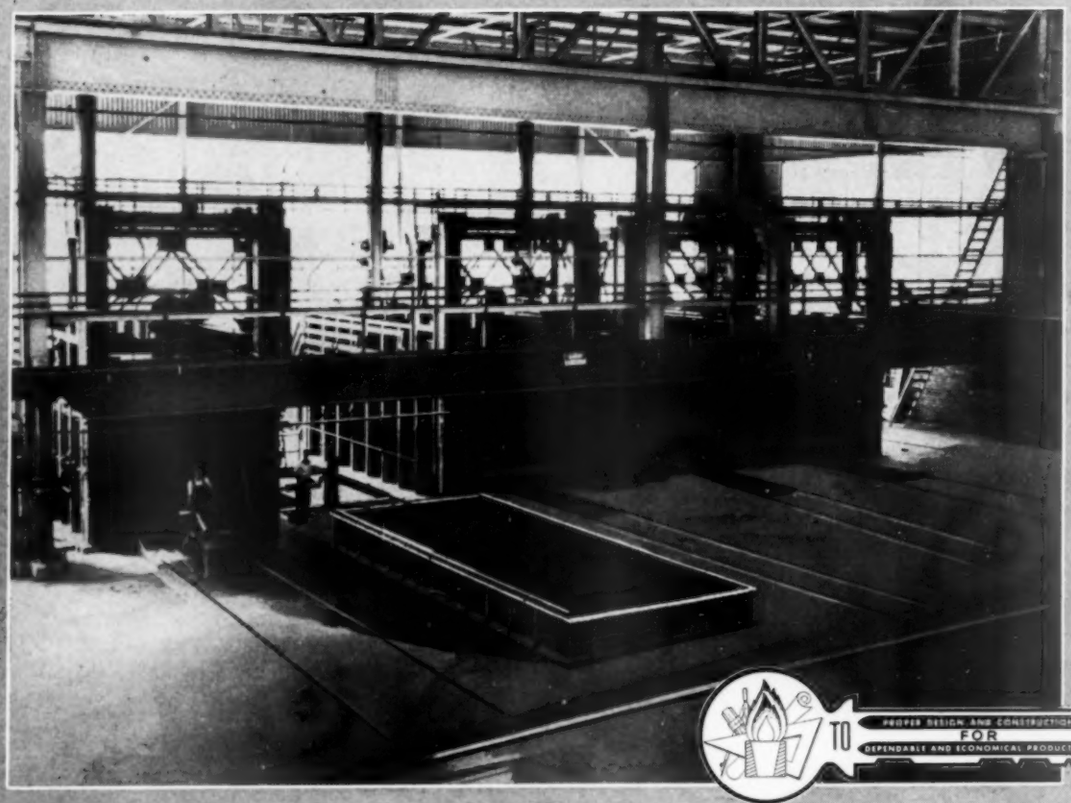
ALUMINUM • BRASS • BRONZE • BABBITT • DIE CASTING ALLOYS • LEAD PRODUCTS • SOLDER • TYPE METAL • ZINC DUST

Car-Type Furnaces
With Quench Tank



By LOFTUS

Tailor-Made Industrial Furnaces for economical performance, longer campaigns and greater production.

Modern design and sound construction of these Car Type Furnaces with Quench Tank assure first quality annealing for carbon and alloy steels.

The two furnaces on the left of picture are over and underfired, and equipped for recirculation of the hot gases. These furnaces provide for a uniform, controlled heat-treating campaign.

The Car Type Furnaces on the right are over and underfired, but do not have the Recirculating System.

Loftus Engineers are prepared to design and construct any type Industrial Furnace to meet your requirements.

Consultation invited

Consultants, Engineers and Contractors for the Steel, Foundry, Aluminum and Brass Industries.

610 SMITHFIELD ST. LOFTUS ENGINEERING corporation PITTSBURGH, PA.

Designers and Builders — Engineers, Consultants, Contractors

"A NORTHERN HI-LIFT HOIST up there *Would Slash Handling Costs*"

An efficient Northern Hi-Lift . . . low-headroom Electric hoist saves in many ways:

1. labor saving

When men lift and move material by hand, the power generated costs you at least $5 per kilowatt hour. Power for a Hi-Lift Electric Hoist costs you less than a nickel per kilowatt hour. Manpower lifting is slow, time wasting, costly. Hi-Lift Hoists do it quickly, economically.

2. time and overhead saving

Inefficient, slow material handling causes delay and countless minutes of lost time all through the shop while other operations wait on handling. Hi-Lift Hoist saves this time and money.

3. saving through safety

Men handling heavy material by hand are subject to serious and costly injuries. Power handling avoids these.

4. saving in floor space and overhead

Northern Hi-Lift Hoists use *no* floor space—carry the material above the floor. There is no vehicle wear on the floor—no danger to workers from rapidly moving vehicles. Aisles are used for work and walk space only—a substantial saving in space. The low-head-room feature of Hi-Lift Hoists makes better use of overhead space—permits handling of bulkier loads.

NORTHERN HI-LIFT HOIST

Northern Hi-Lift Electric Hoists are extremely sturdy, long lasting. Write for Bulletin H-1.

1542

NORTHERN ENGINEERING WORKS

General Offices: 2625 ATWATER ST. DETROIT 7, MICH.

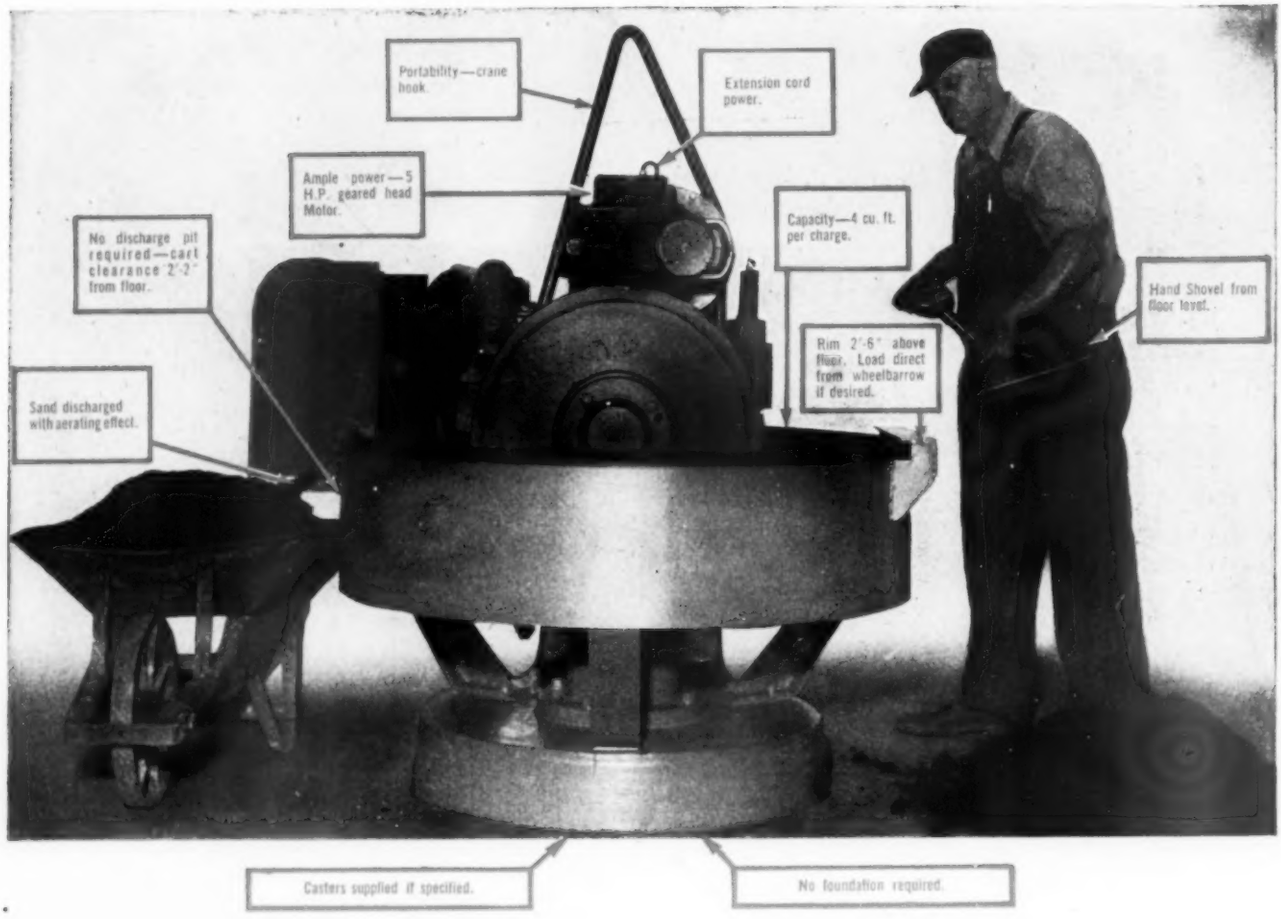
TYPES OF NORTHERN HI-LIFT HOISTS AVAILABLE

Floor controlled hoists • *Motor traveled hoists*
Cab controlled hoists • *Base mounted hoists*

THE CLEARFIELD SAND MIXER

No. 404

✓ Portable ✓ Sturdy ✓ Efficient


Portability—crane hook.
Extension cord power.
Ample power—5 H.P. geared head Motor.
Capacity—4 cu. ft. per charge.
No discharge pit required—cart clearance 2'-2" from floor.
Hand Shovel from floor level.
Rim 2'-6" above floor. Load direct from wheelbarrow if desired.
Sand discharged with aerating effect.
Casters supplied if specified.
No foundation required.

The Clearfield 404 Mixer combines three salient features to simplify sand preparation in the foundry. It is small and compact enough to be moved to the job. This mixer stands up under continuous hard work and is as sturdily constructed as the larger Clearfield models. As the illustration shows, the 404 is efficiently designed to be operated by one man with a minimum of wasted effort. For complete information on Clearfield Mixers write for Catalog No. 77.

The four Clearfield Mixers . . . Nos. 404, 610, 920 and 930. Capacities range from 4 cu. ft. to 40 cu. ft. per batch.

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.

Fishers Furnaces for brass, aluminum, zinc, tin and lead.

Here is a picture that presents an authentic story of progress—a story that is repeated in many foundries thru-out the country—and a story that can save you years of actual experience.

Operated by a seasoned foundryman with thirty years experience, this melting room is in a "captive-foundry" of a large mining machinery manufacturing plant.

The equipment ranges in age from the two No. 80 gas-fired Fisher Crucible Furnaces shown third and fourth from the left, which were the initial units to replace the electrically operated furnaces used by this foundry until 1929. Progressively—the third No. 80 Fisher gas-fired Crucible Furnace was added in 1940—the Fisher Iron Pot Furnace for white metals (equipped with ventilating hood and shown at extreme right) was installed in 1945—and in 1946 the greater demand for heavier brass castings brought about the installation of the Fisher gas-fired, Nose Pouring, Electric Tilting Crucible Furnace shown in the foreground. The last addition, namely the Fisher Nose Pouring Crucible Furnace with a capacity of 675 lbs., per heat, provides melting capacity equivalent to three stationary furnaces and occupies only a fraction of the space. It pours directly into a transfer crucible, eliminating pulling out hot crucibles and transferring them into shanks.

Production capacity has thus been doubled, with conservation of space and improvement of working conditions—and the melting cost is less than 1/3c per pound not including labor or depreciation.

Progress Pictorially—The constantly increasing demand placed on this "captive foundry" has been repeatedly met with more "Fishers" of ever larger capacities, purely on the strength of proved Fisher performance.

Whether your production is large or small, uniform or diversified, there are "Fishers" for your requirements. Consult Fisher and be assured of proper selection, performance, and reliability.

5519 N. Wolcott Avenue Chicago 40, Illinois

Fisher FURNACE COMPANY

Engineers and Manufacturers

CERTIFIED CORE OIL USERS ANSWER "YES" ON ALL COUNTS!

Have you had continually uniform core oil and consequent reduction of worry? *Yes*

Has our core oil worked smoothly in the boxes and satisfied your core makers. *Yes*

Has our oil baked uniformly and quickly in your ovens and speeded production? *Yes*

Does our core oil reduce smoke and gas to an absolute minimum during pouring, as we claim? *Yes*

Have our efforts to give you the best possible service, even under trying war conditions, been a helpful factor in your production? *Yes*

(From an Eastern grey iron foundry)

You can often indentify a core that is made with Certified Core Oil—by its smooth finish, firm edges and generally "right" appearance.

Questionnaires keep us informed on the results our customers are getting with Certified Core Oil — and particularly if they are using the correct grade for current operations.

Many foundries answered "Yes" on all points in a recent questionnaire — attesting that Certified Core Oil is giving complete satisfaction to grey iron, malleable, steel and non-ferrous foundries — jobbing and production — in all parts of the nation.

This satisfaction is due to the always uniform quality of Certified Core Oil, and to our avowed principle that "Core oil to be right must be prescribed."

Certified Core Oil is made in three general types, and each in a number of grades.

Tell us the type and mesh of your sand, and your oven conditions. Let our laboratory prescribe the ideal type and grade of Certified Core Oil for you.

CORE OILS
SOCONY-VACUUM

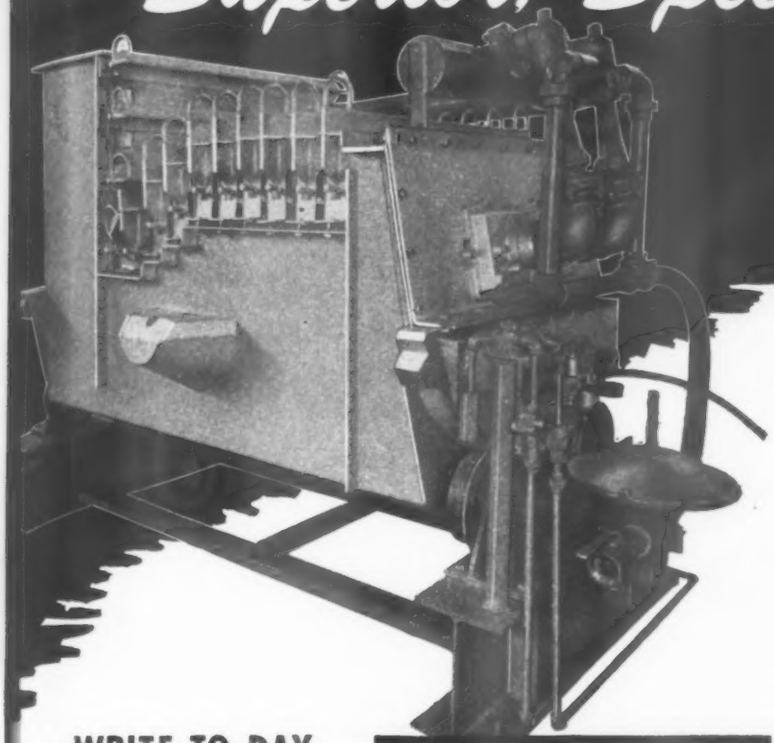
CERTIFIED CORE OIL DIVISION
SOCONY-VACUUM OIL COMPANY, INC.

3308-26 South Cicero Avenue, Chicago 50, Illinois.

Stock and representatives:

Buffalo, N. Y.; Elmira, N. Y.; Worcester, Mass.; Bloomfield, N. J.; Reading, Pa.; Newtown, Ohio; Milwaukee, Wisc.; St. Louis, Mo.; Minneapolis, Minn.; Birmingham, Ala.; Houston, Tex.; Denver, Colo.; San Francisco, Calif.; Portland, Ore.

Use STROMAN FURNACES for *Superior, Speedy Melting*

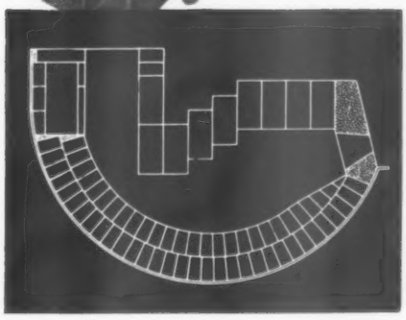


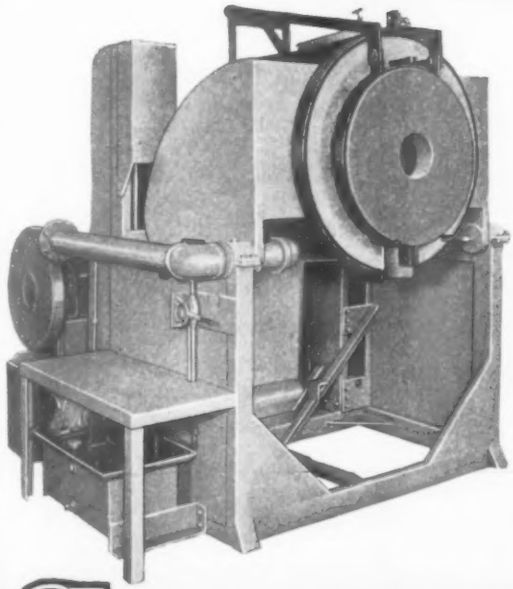
SKLENAR FURNACES FOR MELTING BRASS, BRONZE, ALUMINUM

Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built . . . Quality is unexcelled, both physicals and chemicals. Made in sizes to handle 300, 500, 750, 1000, and 2000 pounds brass capacity they are without a doubt the most advanced, efficient, and economical non-ferrous melting furnaces on the American market . . . however hundreds are in use in England where they were originated. BRASS is being melted in the astounding time of 15 to 40 minutes, depending on the size of furnace.

The furnace illustrated is also highly successful in the making of GREY IRON CASTINGS . . . and melting time for this metal has been clocked between 30 and 60 minutes a heat . . . producing only the best quality grey iron. With a Sklenar Furnace you can operate your grey iron foundry like a brass foundry, by pouring successive heats throughout the day, using the same floor space. Sklenar Furnaces are also highly successful in the melting of ALUMINUM, doing their melting job in the fastest time ever known and giving excellent quality.

WRITE TO-DAY FOR COMPLETE LITERATURE ON ALL TYPES OF NON-FERROUS METAL MELTING FURNACES.





Sklenar design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will melt faster and show fuel savings from 30 to 40%; as the combustion chamber is heated by the same fuel used to melt the metal in the throat of the hopper.

Sklenar Furnaces may be fired by either Gas or Oil. Full information will be sent upon request.

STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACE

Stroman manufactures all types of crucible and iron pot melting furnaces for Brass or Aluminum. They are all the last word in modern design, quality construction, operating ease and economy.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6

The Most Simple yet

➡ REVOLUTIONARY
➡ PRECIPITATING
➡ REFRACTORY
➡ PROCESS in
➡ DECADES!

This Sensational Process is meeting with nation-wide acclaim

This highly refractory, self-vitrifying, high temperature furnace, fire box and crucible coating contains a zirconium silicate base with other high melting oxides. VITROBOND vitrifies at 2090°F and will stand 3850°F before fusing again. Vitrified on furnace walls, fire box, or crucibles it forms a crystalline, semi-glazed surface which unites with the brick and prevents its deterioration. Economical, too; 1 lb. covers 3 to 4 sq. ft. of brick surface.

Saves Thousands of Dollars

VITROBOND prevents disintegration of fire brick in furnaces; extends life from 300% to 400%, and prevents spauling and checking of the fire brick under high temperatures. VITROBOND, although highly refractory, resists heat penetration into brick work and this results in: (1) Quicker "heat-up time" for furnaces. (2) Speedier operation. (3) Saving in fuel. (4) Saving in maintenance costs. (5) Reduction in wear and tear on furnaces from obnoxious gases. (6) Extends the life of furnace brick and crucibles.

Note: For furnaces used in the manufacture of basic steels of the non-acid type such as open hearth Bessemer, stainless, etc., use VITROBASIC, a magnesium oxide base material of the non-acid type.

One of Many Letters Praising VITROBOND

GENERAL METALS CORPORATION
5701 SOUTH BOYLE AVENUE
LOS ANGELES, CALIFORNIA

Gentlemen:

We have been users for some time of Vitrobond high-temperature furnace coating. This material is used for laying the brick in the bung and also as a wash, in our malleable furnace, and it protects the face of the bricks to a remarkable degree from the furnace gases. By using this material, we have increased the bung life in excess of 30%. It is very easily applied and has solved for us a most aggravating problem.

The results have been so satisfactory that we now contemplate applying the coating to other furnaces in our plants wherever similar difficult conditions occur.

Yours very truly,
GENERAL METALS CORPORATION
W. A. DeRidder
President

Successfully used in:

- Railroad Locomotive Fireboxes
- Forge Furnaces
- Return Tubular High Pressure Boilers
- Barrel Type (open fired) Tilting Furnaces
- Pit, or floor furnaces
- Tubular Boiler Fireboxes
- Oil Refining Ovens
- City Power Plants
- Heat Treating Ovens
- Ceramic Ovens
- Sawdust Burners
- Ball Type Furnaces
- Revolving Tube Furnace
- Reverberatory Furnaces
- Glass Furnaces
- Hardening Furnaces
- Steam Ship Fire Boxes
- Soaking Pits
- Open Hearth Furnaces
- Gas Manufacturing Plants
- Refractory Surfacing—Perishable, or Insulating Brick

DISTRIBUTORS! MANUFACTURERS REPRESENTATIVES!

There are still available a few choice territories for Distributors and Manufacturers Representatives. Wire or write for full details.

NATIONAL DISTRIBUTORS

JOHNSON FULLER COMPANY

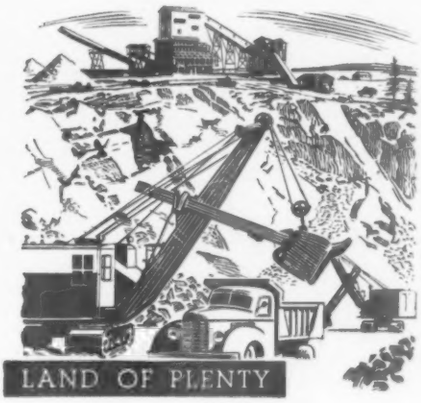
1366 SO. FLOWER ST., LOS ANGELES 15, CALIFORNIA

PRODUCED BY THE WHITMAN COMPANY, LOS ANGELES

THE STORY OF SILICON

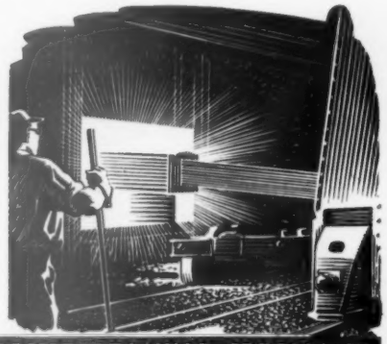
EARLY START IN LIFE

Way back in the Stone Age are found the first uses of silicon—in the tools and weapons used by prehistoric man. These were made of flint, which is almost pure silica, and in silica many centuries later the Swedish chemist Berzelius discovered the element silicon. He produced the world's first ferrosilicon in 1810.



LAND OF PLENTY

"Earth former" is what silicon has been called, for it is present in most all rocks, clays, soils, and even many semi-precious stones. More than one fourth the earth's crust is silicon—the most abundant element, next to oxygen. Electromet digs into mountain after mountain for high-quality silicon ore.

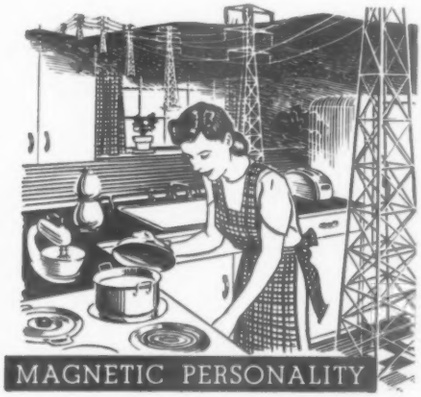


HOUSECLEANING SPECIALIST

Silicon does a "clean-up job" in iron and steel production, serving as both scavenger and deoxidizer. From the molten bath it removes harmful oxides and gases. Silicon is used for refining practically all alloy steels and many grades of carbon steel. It is second only to manganese in its usefulness in steelmaking.

A LITTLE AND A LOT

From about 0.20 to 1.50 per cent silicon goes into many structural steels—such as those used for highly stressed parts of bridges. In larger percentage, sometimes as much as 17 per cent, silicon equips cast irons to handle highly corrosive acids in chemical plants. Silicon also serves as a softener in cast iron.



MAGNETIC PERSONALITY

The heart of the mysterious transformer is made of steel containing silicon. Silicon is essential in sheet steel for electromagnets, generators, and other electrical apparatus because of the special magnetic and electrical properties it imparts to the steel. It has brought about tremendous power savings.

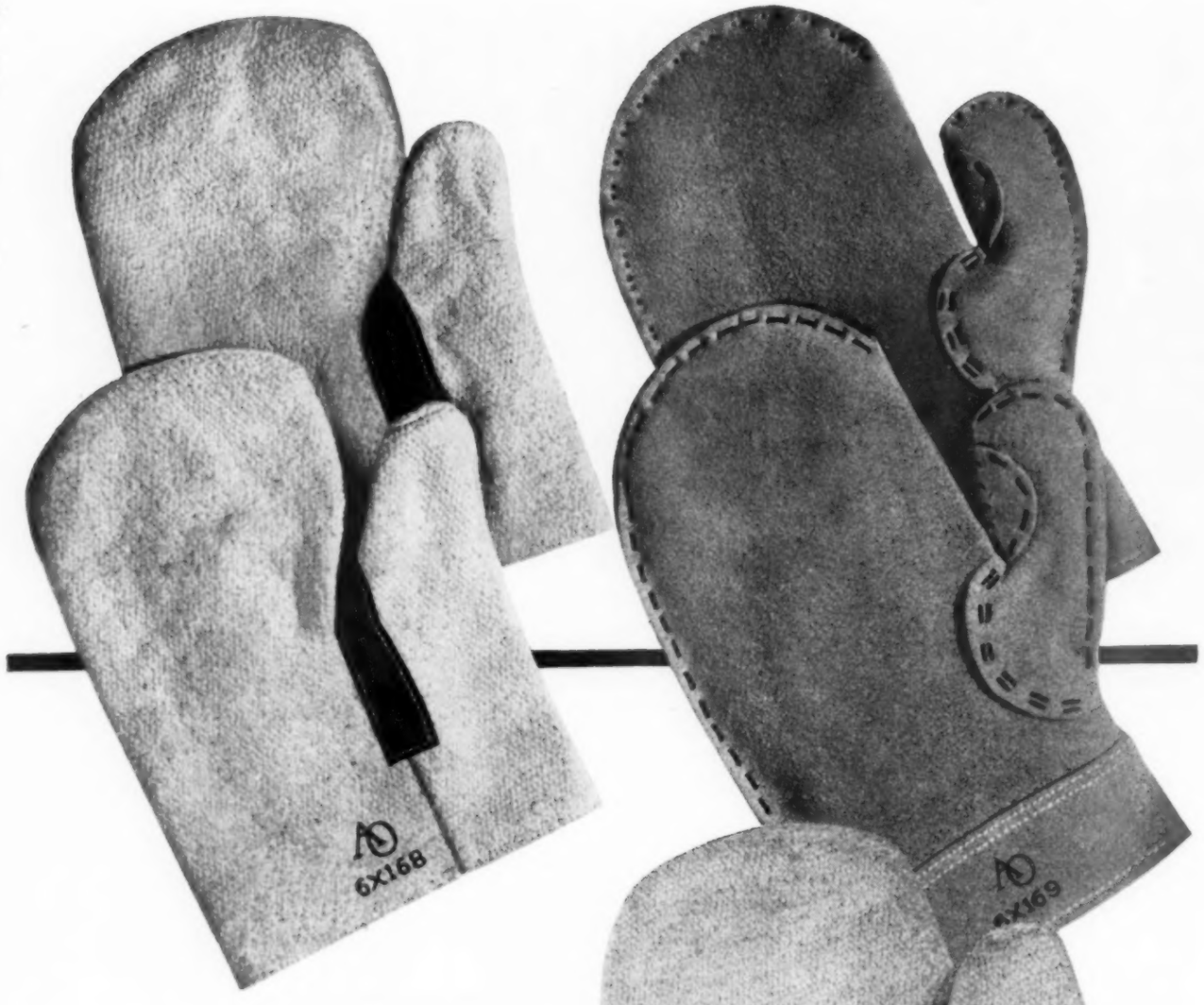
Cream Of The Crop

Electromet's interest in silicon dates back almost 50 years, for in 1898 the broad patent claims of de Chalmot were assigned to the Willson Aluminum Company, one of the predecessors of Electro Metallurgical Company. With its long experience in ferro-alloys production, Electromet naturally knows how to give all its customers alloys of high quality and purity. Write for the booklet "Electromet Ferro-Alloys and Metals," which will tell you more about silicon and the other Electromet alloys.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE-MARK
Ferro-Alloys & Metals



NEW A-O MITTENS

for heavy die casting operations

The 6X168 Cover-Mitt is made from selected asbestos; has a quilted palm, and is lined to provide insulation and added protection. Thumb seam is reinforced with flame-resisting strap.

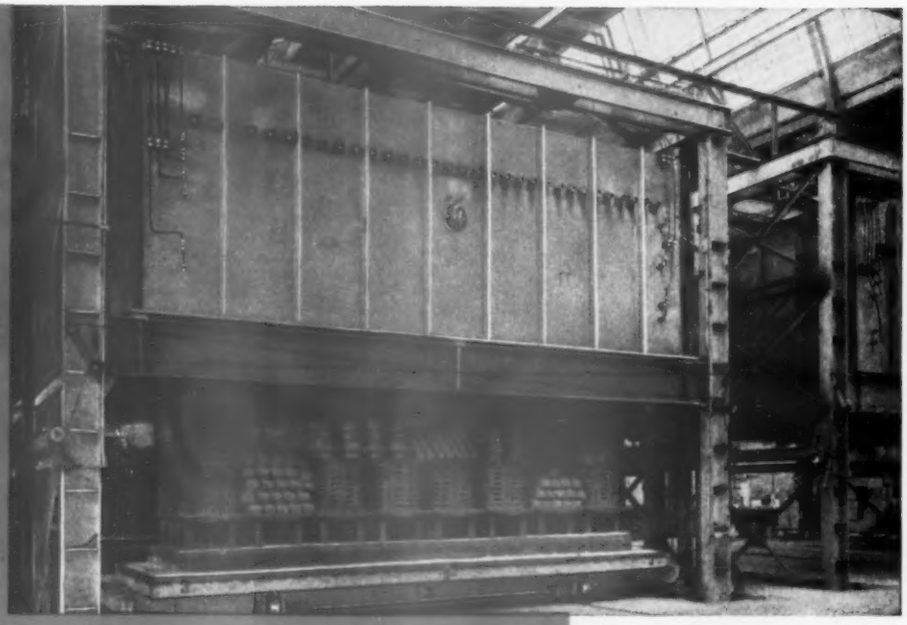
The 6X169 Under-Mitt is made from chrome tanned split horsehide leather, specially tanned to resist heat; is extremely soft and flexible to allow freedom of movement. Seams are steel sewed.

These new A-O Die Casting Mittens are reversible (may be worn on either hand) insuring almost double life; are most effective when used in combination, but may be ordered separately if desired. Your nearest A-O Safety Representative can supply you.

American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

THIS MODERN FOUNDRY INSTALLED 12 ELECTRIC FURNACES



Large castings may be loaded directly on the car, while small ones are usually placed in long-life cast-alloy containers. Electric furnaces promote better working conditions by making the annealing room as clean as any factory.

To Obtain These Annealing Advantages

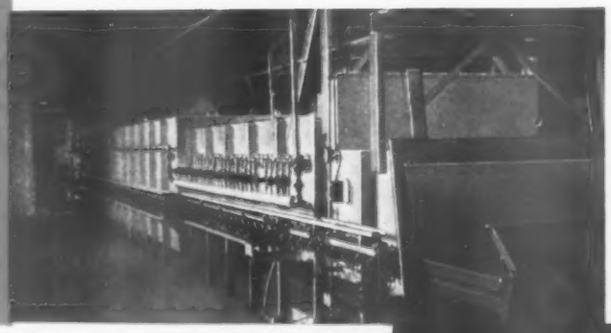
1. **LOW OPERATING COST**—You can keep over-all production costs low with electric furnaces. These costs include such factors as: heat source, subsequent cleaning and machining of parts, transportation to and from furnace, maintenance, continuity of service, etc. In addition, they are compact, saving floor space, and they improve working conditions.

2. **UNIFORM HIGH QUALITY OF ANNEAL**—The accurate control of temperature, atmosphere, and heat distribution possible in an electric furnace assures consistent, uniform, high-quality production.

3. **SHORT-TIME CYCLE**—The normal annealing cycle is materially reduced by arranging the high- and low-temperature furnaces in teams of two.

4. **CONTINUITY OF SERVICE**—General sturdy construction and long-life heating equipment of G-E furnaces keep shutdowns to a minimum.

5. **ATTENDANCE AND SUPERVISION MATERIALLY REDUCED**—Regulation of the heating and cooling cycle is completely automatic.



Where a condition in annealing production warrants a continuous furnace, a G-E roller-hearth electric furnace with automatic charging and discharging and automatic time and temperature control is recommended.

World's largest installation of electric elevator furnaces, at Lake City Malleable Inc., Ashtabula, Ohio

● When Lake City Malleable Inc., found it necessary to build a new plant to meet war-time orders, they installed 12 G-E elevator furnaces to help with the job of producing high-quality annealed malleable iron in large quantities. The furnaces are arranged in six groups, each group consisting of a high-temperature and a low-temperature furnace—a combination which shortens the annealing cycle and eliminates the necessity for any cooling and subsequent heating of the high-temperature furnace.

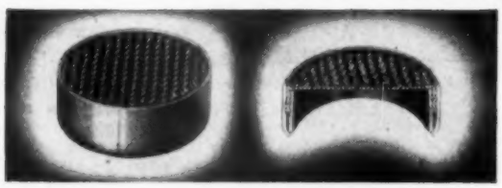
Appreciable savings in over-all floor space are possible with the elevator type furnace construction. Loading capacity usually varies from 16 to 20 net tons per car. Automatic control provides complete and accurate regulation of the heating and cooling cycle.

If you are interested in obtaining these advantages for your foundry, you can get more detailed information on G-E equipment from our heating specialist in the nearest major city, or by writing to the General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

Core Blowers!

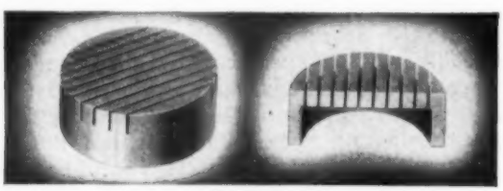
NO BLOWOUTS with RIENACKER CORE BOX VENTS!



SCREEN TYPE—Patent No. 2,263,974

For HIGH-SPEED production. Made from 30 mesh monel screen lapped 3/16" over brass innertube and firmly secured with brass outertube, making a strong, fool-proof unit. Each vent is sized through a die assuring accurate fit. The compression between outer and inner tubes holds screen securely in place without slightest danger of blow-out. Costly work stoppages to repair or replace vents are eliminated.

Use Rienacker core vents (screen type) whenever possible—on all flat surfaces, and on curved surfaces wherever core marks are unimportant. You get fastest air escape with minimum liability of clogging.



SLOTTED TYPE—Patent No. 2,238,506

For CONCAVE and CONVEX RADII. Made of brass, precision slotted for greatest air escape possible with this type of vent. Standard slot width for cast iron .014; for brass .010. Core vent hole should be made with a step-drill so that bottom of vent rests on shoulder thus provided. This slotted vent is easily shaped to any curved surface; leaves no core marks on casting.

• • •

Write for information and prices on gas escape vent bushings for use with round or rectangular vent rods. Round bushings in all drill rod sizes; rectangular bushings: 3/32" x 1/4"; 3/32" x 3/8"; 1/8" x 1/4".

There's a RIENACKER Core Vent Dealer near you!

•

Hill & Griffith,
2931 N. Seventh St.
Birmingham 1, Ala.

Caswell & Company,
2357 E. Slauson,
Los Angeles, Calif.

Pacific Graphite Works,
40th & Linden Streets,
Oakland 8, Calif.

Industrial Supplies,
1434 Howard St.,
San Francisco 3, Calif.

S. Obermayer Co.,
2563 W. Eighteenth St.,
Chicago 8, Illinois

Charles E. O'Connor,
2741 W. Agatite Ave.,
Chicago 25, Illinois

Midwest Foundry Supply Co.,
Edwardsville, Indiana

Klein-Farris Co.,
683 Atlantic Ave.,
Boston 11, Mass.

Redford Iron & Equipment Co.,
21315 W. McNichols Rd.,
Detroit 19, Michigan

Frederic B. Stevens, Inc.,
510 Third St.,
Detroit 26, Michigan

A. T. Wagner Co.,
2720 Wight,
Detroit 7, Michigan

Wolverine Foundry,
3911 Bellevue,
Detroit 7, Michigan

Foundry Supply Co., Inc.,
2295 University Ave.,
St. Paul 4, Minn.

Standard Manufacturing Co.,
4 No. Eighth St.,
St. Louis 1, Mo.

Frederic B. Stevens, Inc.,
903 Stone St.,
Buffalo, N. Y.

Combined Supply & Equipment Co.,
215 Chandler,
Buffalo 7, New York

A. J. Heysel,
140 Chandler,
Buffalo 7, New York

Weaver Material Service,
1807 Elmwood,
Buffalo 7, New York

F. F. Shortsleeve,
P. O. 459,
Elmira, New York

Jos. Rindt,
140 W. 42nd St.,
New York 18, N. Y.

Leon M Bristol,
P. O. Box 1384,
Syracuse 1, N. Y.

Goehringer Foundry Supply Co.,
919-921 W. Fifth,
Cincinnati, Ohio

Hill & Griffith,
1263 State St.,
Cincinnati 4, Ohio

Federal Foundry & Supply Co.
4600 E. 71st St.
Cleveland 5, Ohio

Hoffman Foundry Supply Co.,
1193 Main Ave.,
Cleveland 13, Ohio

Rossborough Supply Co.,
Box 2212, Brooklyn Station,
Cleveland, Ohio

Hamilton-Parker Fuel Supply Co.,
491 Kilbourne,
Columbus, Ohio

Fenton Foundry Supply Co.,
Dayton, Ohio

Freeman Supply Co.,
1152 E. Broadway,
Toledo 5, Ohio

La Grand Industrial Supply,
Portland, Oregon

Western Industrial Supply Co.,
208 S. E. Hawthorne Blvd.,
Portland 14, Oregon

Pennsylvania Fdry. Supply & Sand Co.,
Ashland below E. Lewis—Frankford,
Philadelphia 24, Penn.

S. Obermayer Co.,
33rd St. & Allegheny Valley R. R.,
Pittsburgh 1, Pa.

Carl F. Miller & Co.,
1217 So. Sixth Ave.,
Seattle 4, Wash.

Carl F. Miller & Co.,
120 So. Madison Ave.,
Spokane, Wash.

Donald Sales & Mfg. Co.,
6601 W. State St.,
Milwaukee 13, Wis.

Engineering Service Inc.,
610 W. Michigan,
Milwaukee 3, Wis.

Interstate Supply & Equip. Co.,
Milwaukee 4, Wis.

•

RIENACKER INDUSTRIES, INC.

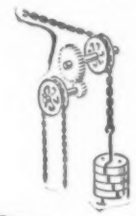
2038 Hilton Road, Detroit 20, Michigan

ISSUED MONTHLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

Even in Big Furnaces it's the Little Things that Count

Keep your eye peeled to the "little" things when you compare furnace designs and prices. For the little things make the big difference in operating convenience, furnace life, product quality and overall running cost.

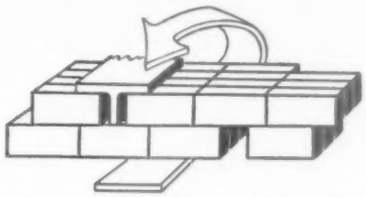
Here are a few of the little details built into R-S furnaces for over 38 years—details which "go beyond the line of duty" in nipping trouble before it starts.



Look first at the door hoist mechanism. In every R-S design you'll find a spur gear transmission betwixt hand-chain sheave and door-lift sheave. It gives a mechanical advantage which saves muscle, and brakes unwanted door movement.

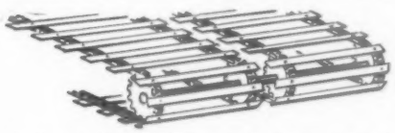
Look at the arch. If it's over 12 feet across, beware of the cheaper sprung design. Modern insulating refractories, however remarkable in thermal characteristics, fall short as regards yield in compression. Every R-S arch over 12 feet is flat—with individually hung bricks.

Look next at the hearth—and its expansion joints. In the ordinary furnace, scale can fall into that joint, eventually jam it, and shorten hearth life. But not in an R-S. Each joint is made oversize by the thickness of the vertical web on a



molded-and-fired refractory T which caps the gap.

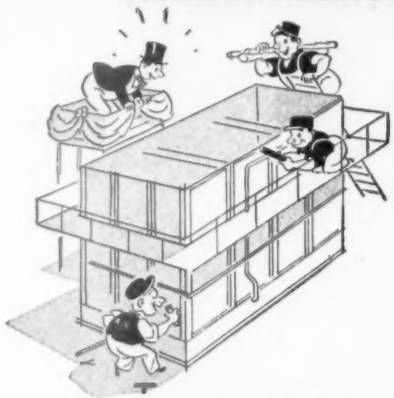
Look finally at wide chain-and-slat conveyors. Under temperature and continued service no two chains will expand just alike. A single 8-foot slat bolted across 4 or 5 chains will strain or cause



stutter as the chains give. R-S never bolts a slat at more than two places—even if it means two 4's in place of every 8. Thus slat ends can give, and chains stay free and easy.

And so it goes . . . for R-S knows that even in big furnaces it's the little things that count.

WE LIKE SIDEWALK SUPERINTENDENTS!



. . . so the buyer sees why an R-S furnace is worth more than it costs

R-S builds only "on location". It doesn't fabricate at home and just assemble in public. It wants the men who matter to be able to see every joint before it's hidden, to count every buckstay as it's welded in, to kibitz on fussy special burner settings, and to watch the work-handling mechanisms adjusted.

That way they *know* why they get faster production, better metallurgical results, smoother mechanical handling, and less maintenance over extra long furnace life—they're *sure* they acted wisely when they advised taking the R-S bid.

Report on Giant Magnesium and Aluminum Forging Job Available

At Grafton, Mass., (Wyman-Gordon) three noteworthy R-S apron-conveyor furnaces (each rated at 4400 lbs. of billets per hour) serve an 18,000-ton press. An R-S roller-rail furnace (2,000 lbs. per hr.) heat treats the final forgings. All are forced convection furnaces, with independent zone control. The temperature uniformity (within 2°F) is exceptional for such size. The installation has been reported in detail with photographs. Write S. M. Stoler, Sales Mgr., R-S Products, Phila. 44, for your free copy.

Better Heat Distribution and Fuel Economy With Oil Firing

R-S engineers are much interested in Fred Bloom's new "unit atomizer" which employs high pressure steam (80 to 125 psi) to gasify up to 125 gph of heavy fuel oil, and supplies as many as 10 separate furnace burners from one control point.

The new device permits designing for more and smaller burners, with consequent gains in the power to manipulate heat distribution throughout the furnace chamber. It further permits using heavy oil on jobs for which gas or lighter oils would ordinarily be specified.

Applications which immediately suggest themselves include strand annealing, cycle hardening, and all continuous mesh-belt or conveyor processing.

Write Fred Bloom in Pittsburgh for a copy of his Bulletin No. 1077.

Here We Are! Now, why?

Here we are with our first edition of FURNACE FACTS. You'll see us in this publication monthly from here out.

And here's why!

We believe that there has been too much furnace buying on the basis of hope and hokum—too little on the basis of information and fact. Our aim is to get down to cases—on what makes a furnace a good furnace. Our means of attaining that end will be our advertising space—loaded with what we believe will help you most—news and FACTS.

JMLco J-2

SAND TESTING IMPROVES
The FOUNDRY BALANCE SHEET

When you install a consistent sand testing program, you may expect a very real improvement in the appearance of your profit and loss statement for five definite reasons.

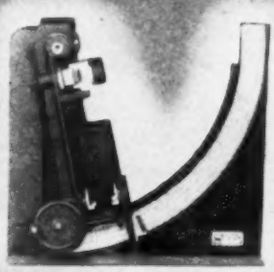
1. You reduce your scrap losses.
2. You can use molders who are less highly skilled.
3. You automatically improve casting finish.
4. You eliminate any disagreement on methods of procedure.
5. When trouble does develop, you can spot the cause much more quickly and get it corrected sooner.

This isn't just beautiful theory. It has been done many times. It is being done today in many foundries. It really works and it might just as well work for you, too.

The cost of putting a SAND CONTROL program in your foundry will not be prohibitive by any means and it is quite possible that you will be surprised at the small cost involved.

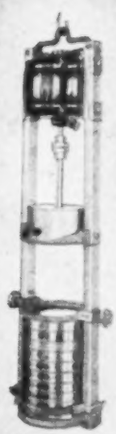
MOISTURE CONTROL

PERMEABILITY CONTROL



STRENGTH CONTROL

MOLD HARDNESS CONTROL



FINENESS CONTROL

LABORATORY SERVICE

The services of a complete sand laboratory, the consultation of foundry specialists, are available for the solution of difficulties you may encounter in your work. Stop trouble when it begins. Send defective samples promptly to the Detroit Laboratories before losses build up. This is a non-profit operation maintained solely to assist you.

Harry W. Dietert Company

DIETERT SAND MOLD CONTROL MOISTURE SULFUR CARBON EQUIPMENT

9324 ROSELAWN AVE. • DETROIT 4, MICHIGAN

STOP LOSING MONEY

...get faster-baking cores

STOP LOSING MONEY

STOP LOSING MONEY

STOP LOSING MONEY

STOP LOSING MONEY with slow-baking cores that tie up your ovens! Truline-bonded cores bake up to 25% faster, often eliminate one extra trip through tower ovens.

STOP LOSING MONEY with cores that are hard to shake out! Truline* cores burn out quickly, shake out easily, save as much as 50% of valuable cleaning time. Foundrymen report this saving, alone, more than pays for the Truline Binder used.

STOP LOSING MONEY with less economical binders!

HERCULES
TRULINE BINDER

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
999 Market Street, Wilmington 99, Del.

*REG. U. S. PAT. OFF. TRADE MARK OF HERC. POWD. CO.

NB-63

A National System on the side floor of

HIGH SILICON IRON

JISCO

KEEP YOUR FOUNDRY PRODUCTION PROBLEMS...

Right Under Your Thumb

Jisco Blast Furnace Silvery takes the guesswork out of your foundry practice. It blends with your gray iron scrap and other melting stock to produce castings of uniform grain structure and correct metallurgical content. Jisco Silvery supplies the silicon needed to give the required physical properties to your castings. It assures accurate control of your foundry operation.

The use of Jisco Silvery reduces defects and losses due to scrap castings. This means lower costs and better castings shipped. Your customers are satisfied—and so are you.

Jisco is a "must" in today's foundry practice. Write for complete information.

Advice to Andrew Jackson by his mother "Never brook wanton outrage upon your own feelings. If you ever have to vindicate your feelings or defend your honor, do it calmly. If angry at first, wait till your wrath cools before you proceed.

THE JACKSON IRON & STEEL Company

JACKSON, OHIO.

another

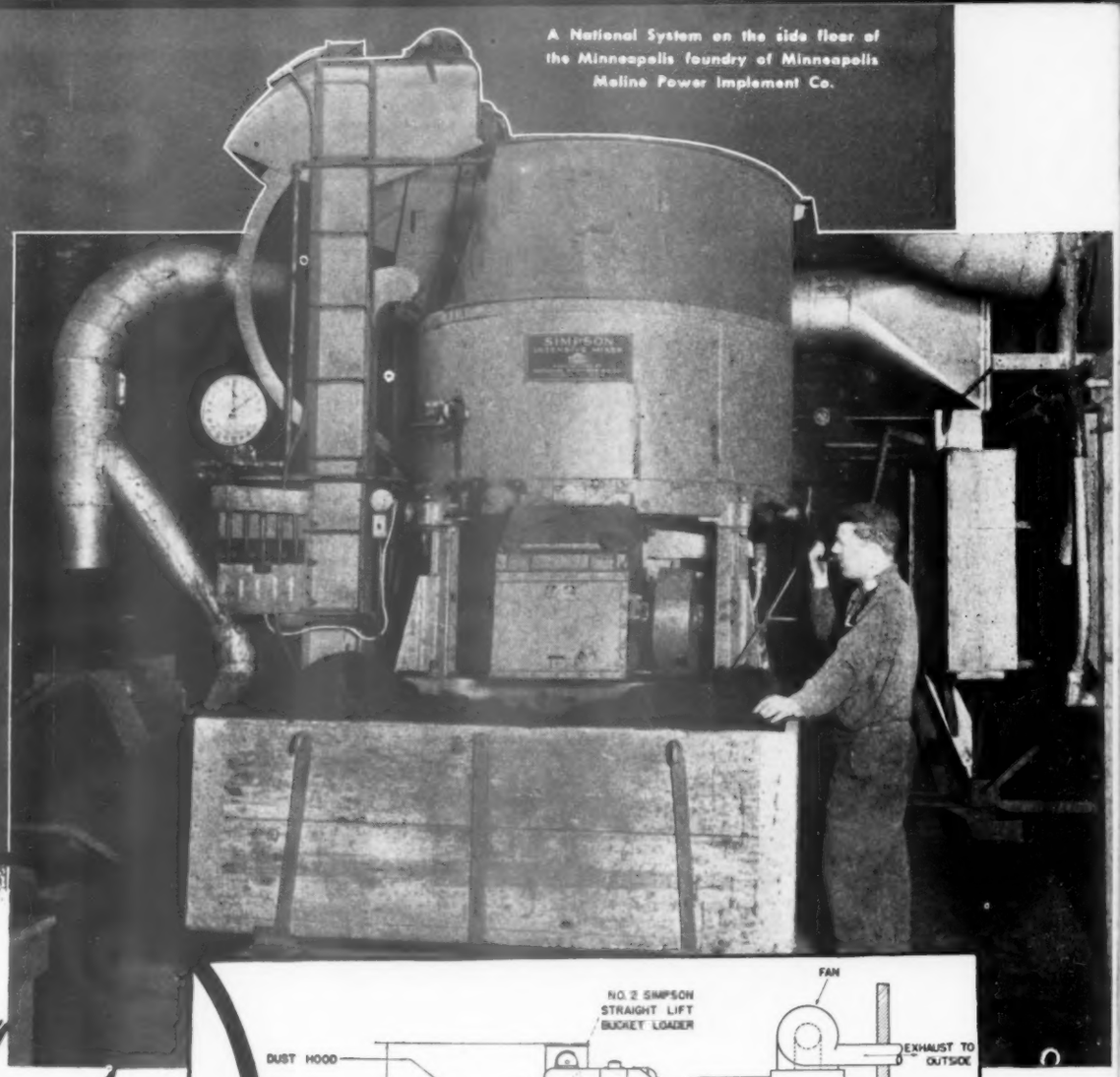
IATIONAL

compact

SAND SYSTEM

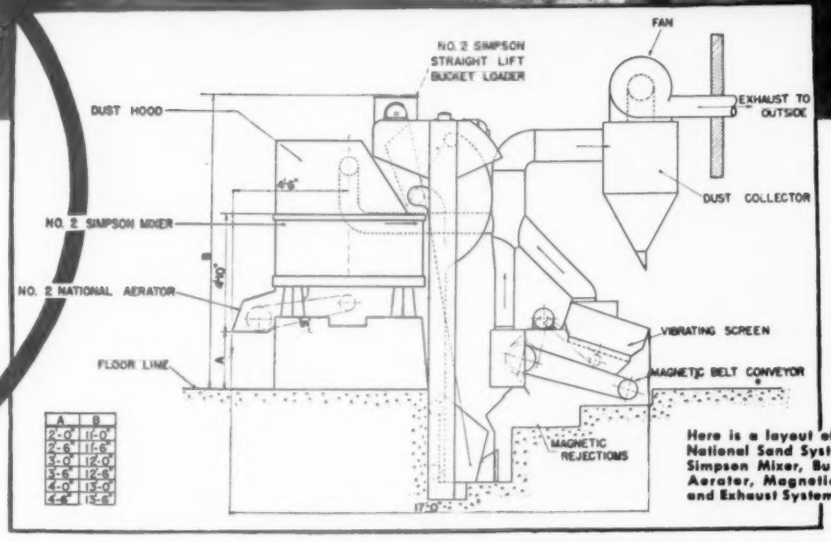
•

.. improving asting quality and lowering costs!



A National System on the side floor of the Minneapolis foundry of Minneapolis Moline Power Implement Co.

mulling facing sand on the side floor!



A	B
2'-0"	11'-0"
2'-6"	11'-6"
3'-0"	12'-0"
3'-6"	12'-6"
4'-0"	13'-0"
4'-6"	13'-6"

Here is a layout of a compact National Sand System: a No. 2 Simpson Mixer, Bucket Loader, Aerator, Magnetic Separator and Exhaust System.

FOUNDRIES of large, medium and small size are finding very profitable use for this compact National Sand System—they all value it for the same ultimate reasons: it helps them produce better castings at a saving in cost and time.

For example: the above installation is used on the side floor of a good sized foundry for preparing facing sand for the large work which is made on the floor. Although this foundry has a large National System for sand preparing, sand handling and mold handling for high production work they find it a great advantage to have this separate National System.

Whatever the capacity of your foundry may be, there is a good possibility that a compact National Sand System will add to the efficiency and lower the cost of operations and finished castings.

Ask a National representative to discuss the details with you.

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

Manufacturers and Selling Agents for Continental European Countries — The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand — Gibson, Battie & Co., Pty., Ltd., Sydney, Australia

IRONTON CARO-LINE

THE MONOLITHIC REFRACTORY MATERIAL FOR ACID ELECTRIC STEEL FOUNDRIES

"Ironton Caro-Line" siliceous ramming refractory mixed with grain sized ganister, is giving outstanding service in rammed acid electric furnace sidewalls. Try it in your furnaces and you will be pleasantly surprised with the results obtained.

The same mix has been used successfully for several years for rammed in bottoms, also for lining ladles handling electric steel. There is no better refractory for electric steel foundries than "Ironton Caro-Line".

We offer you the assistance of an engineer in ramming your first lining and training your men to do the job. Write to us today.

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

GIVE YOUR PLANT A PERMANENT AIR CLEANING

Good foundry working conditions—*always profitable*—are essential now, and will become even more important as competition becomes keener.

Clean air for all operations is the basis of good foundry working conditions. Contaminated air sharply reduces production and employee efficiency. It follows then that only the most effective and permanent dust control equipment is suitable to your requirements.

Schneible Multi-Wash Dust Collecting Systems, operating on the sound principle of bringing the dirty air repeatedly in intimate contact with water, are the most logical mediums for eliminating dust and fumes. They have withstood every test for over a quarter of a century. They are highly efficient in removing contaminated air from the working zones, and simply dispose of collected dust and fumes.

There are no parts in Schneible collectors to break, burn, clog or rapidly wear. Schneible systems are low in final cost because they require practically no attendance and a very minimum of maintenance. The water or other washing liquid is reclaimed for repeated use in the collector system.

Schneible systems solve your dust and fume problems permanently. Send for catalog No. 310.

CLAUDE B. SCHNEIBLE CO.

2827 Twenty-Fifth St., Detroit 16, Mich.

Engineering Representatives in Principal Cities

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

THIS HINES A
HAD TO B

THE DRAG
15" x 50" x 4"

HINES ALUMINUM DRAG FLASK . .	46 lbs.
BOTTOM BOARD .	32 lbs.
SAND	148 lbs.
Total Weight . .	226 lbs.

A LIFT OF 113 LBS. PER MAN

A flask this size does involve a substantial amount of sand and therefore must be sturdy and rigid enough to maintain its accuracy under the resulting heavy pressures. The Hines ALUMINUM "Pop-Off" Flask on this job met all requirements and still was handled easily by hand.

HINES
POP-OFF
(Trademark Reg. U. S. Pat. Off.)
FLASK

BUILDERS OF FLASKS AND JACKETS EXCLUSIVEL FOR

THE HINES

3431 WEST 140th ST.

ALUMINUM "POP-OFF" FLASK

TO BE STRONG · STIFF · RUGGED

Note how easily this cope is handled by hand in the illustration above. Sand was the only weight factor here.

A LIFT OF 149 LBS. PER MAN

THE COPE
15" x 50" x 6"

HINES ALUMINUM COPE FLASK .	77 lbs.
SAND	221 lbs.
Total Weight . .	298 lbs.

FOR OVER TWENTY-FIVE YEARS

FLASK CO.

CLEVELAND 11, OHIO

DILL, Inc.
RUSHVILLE, INDIANA. ...

GOES ALL OUT FOR DIAMOND

Originators of

SNAP FLASKS

HERE in their new modern daylight foundry they find Diamond Flask Molding Equipment giving them uninterrupted production of fine gray iron castings.

This is typical of a host of other foundries using Diamond Flask Equipment for the past 57 years.

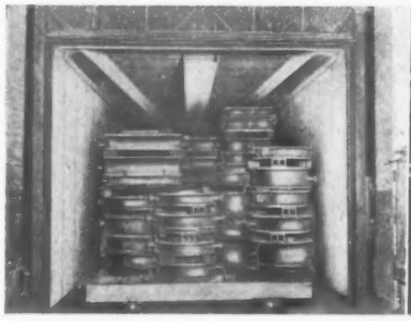
DIAMOND

Telephone 2553 — CLAMP AND FLASK COMPANY — Richmond, Indiana

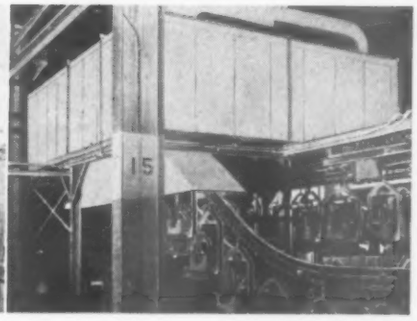
Designers of CORE PLATES, JACKETS, BANDS, FLASKS *since 1889*

INVEST NOW

In More Uniform • Faster Heating at Lower Cost-

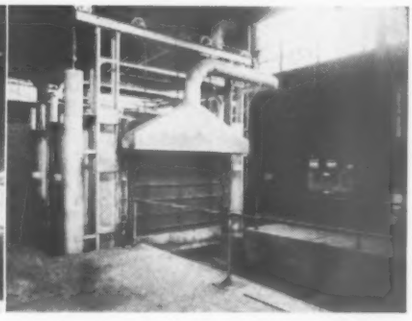


Gehnrich mold drying oven, equipped with power-operated lift doors; heats a gross load of 150 tons; recirculation heated uniformly (note heat distribution ducts) from an oil-fired heater built integrally with rear oven wall.

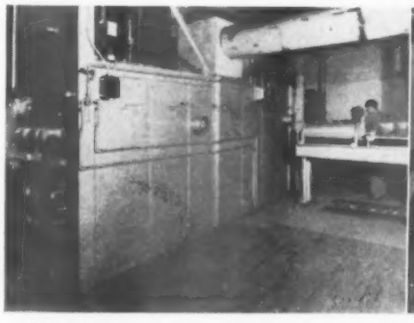


Gehnrich continuous core spray drying oven, for 4-pass counterflow, 200 ft. travel of work on racks; heated by gas-fired, external air heaters and full length recirculation system; oven mounted above floor, saving useful floor space.

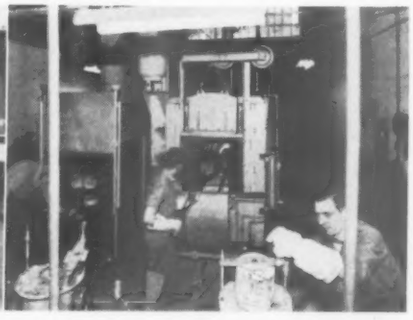
Rockwell gas-fired, pusher-tray furnace for annealing large rear axle housing castings; pusher and puller mechanisms and furnace doors interlocked and operated in automatic time cycle.



Rockwell car bottom type, oil-fired furnace with bridge wall firing, providing uniform heat distribution to heavy load, without direct flame impingement on the work.



Gehnrich oven for drying refractory molds and melting out wax investments in precision casting; heated by air from the mold heating furnace, shown at right; trucks moved by air cylinder.



Rockwell gas-fired furnace for preheating (at 1100° F.) and heating (at 1400° F.) refractory molds and castings; work moves by air cylinder pusher; work being removed to put into cooling station at left.

CONVERT

Inefficient Baking, Drying and Heat Treating to Improved Operation with

GEHNRICH OVENS AND ROCKWELL FURNACES

In practically every foundry heating operation from baking cores in small pull-drawer or truck ovens, to heat treating of aluminum or magnesium castings in batch or continuous conveyor ovens through crucible melting of non-ferrous metals and final annealing of castings of all sizes and quantities in car type or continuous furnaces, you'll find it wise to depend on the 57 years' experience of Rockwell-Gehnrich engineering.

Every foundry heating problem is individually treated and solved on the basis of improved heat processing for better production economy. You'll find that applied—as have hundreds of foundries everywhere—whether you need a cabinet oven or a large pusher type or continuous conveyor oven or furnace.

Here are a number of interesting bulletins on how Gehnrich Ovens and Rockwell Furnaces can help your foundry practice.

THEY'RE FREE—WRITE

W. S. ROCKWELL COMPANY
210 ELIOT ST. • FAIRFIELD, CONN.

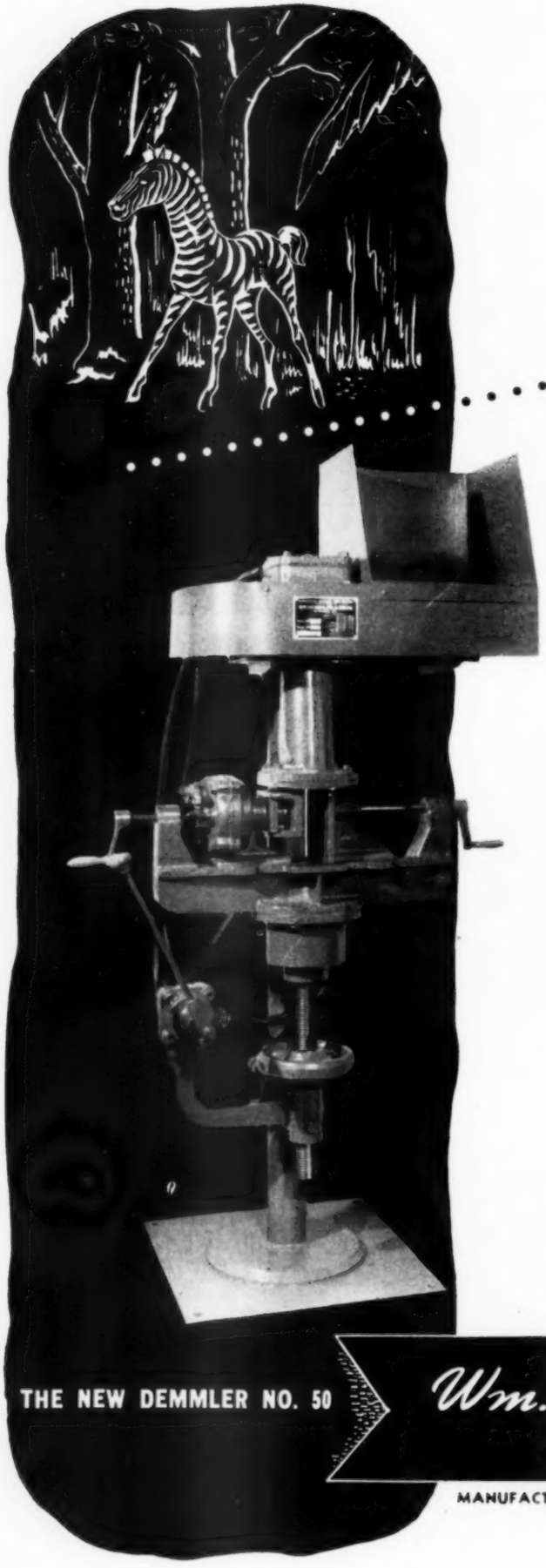
Please send me the following:

- ☐ Gehnrich Foundry Ovens.
- ☐ Gehnrich Ovens for Metal Finishing.
- ☐ Rockwell Pusher Type Furnaces.
- ☐ Rockwell Car Bottom Furnaces.
- ☐ Rockwell Conveyor Furnaces.
- ☐ Rockwell Oven Furnaces.
- ☐ Rockwell Crucible Melting Furnaces.

*Name*_____

*Company*_____

*Address*_____



ESPECIALLY ADAPTED

The zebra's stripes are perfect camouflage, making him especially adapted to the terrain in which he lives. The new DEMMLER No. 50 core blowing machine is especially adapted, too—especially adapted to short run jobs on small cores because of its quick, easy adjustments and simplicity of operation.

There is no small core blowing machine on the market today that offers so much for so little!

The DEMMLER No. 50 is a DEMMLER machine throughout—a machine you will be as proud of 10 years from now as today! It is equipped with both vertical and horizontal automatically operated air clamps. In fact, most of the important features of the large DEMMLER models are found on this reasonably priced machine.

The DEMMLER No. 50 is capable of blowing 200 cores an hour—every hour—and will easily handle cores weighing up to three pounds.

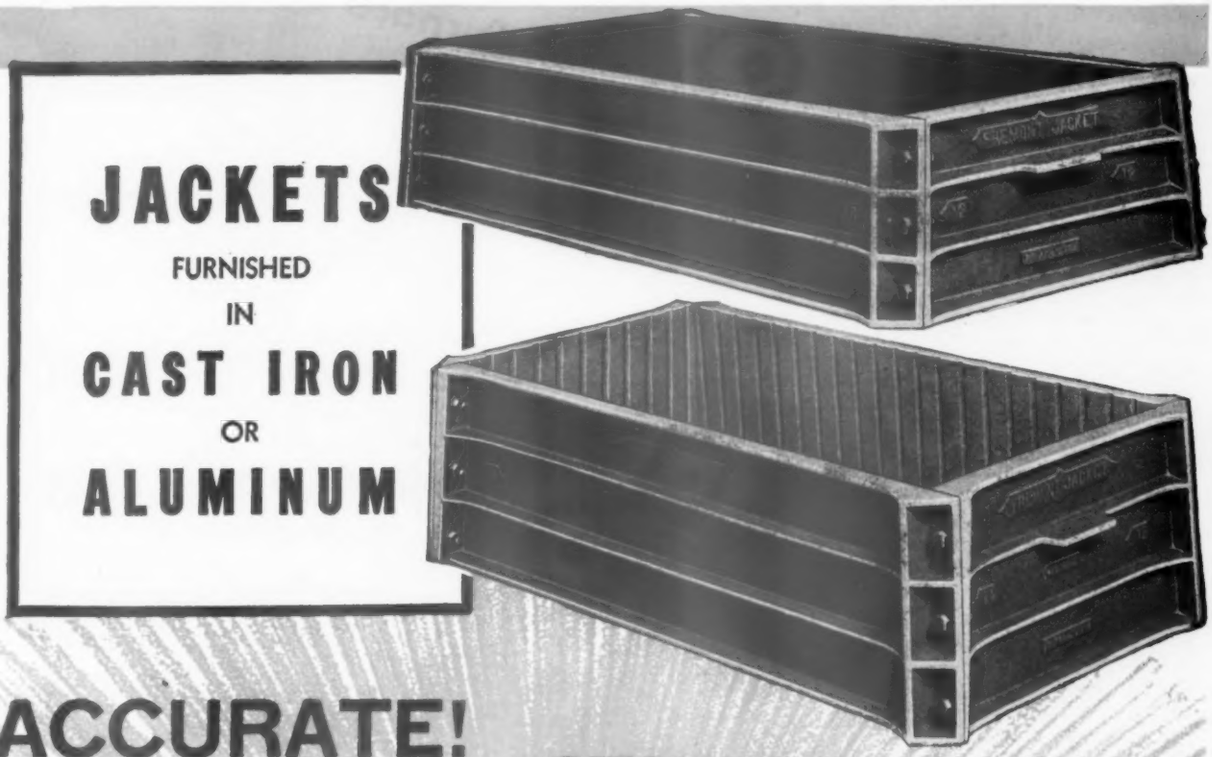
Height of the table is adjustable from 30 to 36 inches for the comfort of whoever operates it, and ANYONE can operate the DEMMLER No. 50! By means of a single hand valve, the core box is clamped and the core blown in but three seconds. No installation is necessary. Connect to an air hose and the machine is ready to use.

Here, at last, is the solution to the rapid and profitable production of small, high quality cores—the DEMMLER No. 50!

THE NEW DEMMLER NO. 50

Wm. DEMMLER & Bros
Kewanee, Illinois

MANUFACTURERS OF CORE BLOWING EQUIPMENT EXCLUSIVELY SINCE 1911



JACKETS
FURNISHED
IN
CAST IRON
OR
ALUMINUM

ACCURATE! ***STURDY!*** LIGHT!

BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK
THE FOOL-PROOF PIN

FREMONT MAGNESIUM FLASKS

THE FREMONT FLASK CO.
Fremont, Ohio

double your Output at Half the Cost with a Radiant Furnace

These 2 No. 70 crucible furnaces replaced 7 No. 70 crucible coke-fired furnaces. Name of user on request.

FIRE 1 FURNACE GET THE OUTPUT OF 2

YES, IT'S TRUE—you can double your production at half the cost with the new Radiant top-fired furnace that pays for itself the first six months! This fuel-saving, faster-heating furnace has *two* crucibles, loaded at all times; while the first crucible is heated, the flue gases from it preheat the second crucible. While the metal from the first crucible is poured, a third crucible replaces the removed one to receive cold metal. Each side is fired alternately, as the covers are cam lifted and swung backward independently.

This revolutionary new Radiant furnace can be fired with gas or oil in tandem. Both stationary and tilting types are available. For further information, write today—use the handy coupon below.

RADIANT COMBUSTION, Inc.

BUILDERS OF EVERY TYPE (OIL, GAS, ELECTRIC) OF HEAT TREATING FURNACE

WARREN, . . OHIO

SEND FOR FURTHER INFORMATION

RADIANT COMBUSTION, Inc.
WARREN • OHIO

Company_____

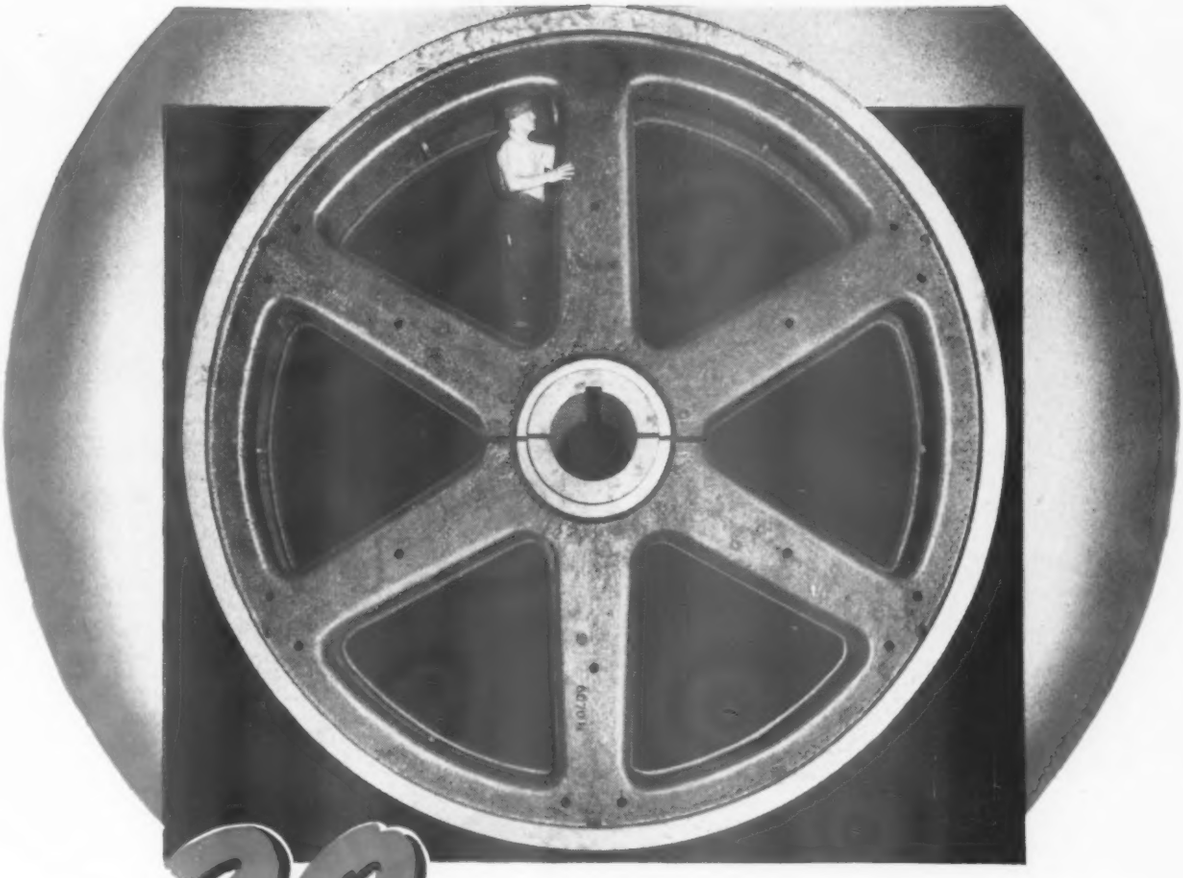
Your Name_____

Address_____

City_____ State_____

18 ADVANTAGES OF A RADIANT FURNACE

1. 25 to 30% fuel saved on aluminum and magnesium. 40 to 50% fuel saved on brass and copper.
2. 50 to 100% longer pot life.
3. 50 to 100% longer lining life.
4. 50 to 100% longer cover life.
5. 50 to 100% longer burner life.
6. Easy to charge. (No flame through cover)
7. Far lower metal loss. (Flame does not impinge on metal)
8. Faster heating. (Combined radiant and convection heating)
9. Less slagging. (Less slagging and no slag build up possible)
10. Lining is easy to replace. (No burner ports)
11. Burners easy to inspect and replace. (Change in 15 minutes)
12. Burners cannot plug. (Burners in top where slag or metal cannot reach them)
13. Pure metal. (Neutral pressure on metal surface allows charcoal or atmosphere to be used)
14. Furnace can be flued through the floor to the outside, eliminating heat and gases in foundry.
15. No leakage of cover. (No flame through or around cover)
16. Quiet operation.
17. Unobstructed flueing. (Flued at bottom and charge does not affect it)
18. Metal is visible at all times and temperature can be taken at any time, without shutting off burners.



A 20-TON EXAMPLE

of Soundness and Machinability

It's a 20-ton steel casting—a huge gear blank—made with Republic CHATEAUGAY Pig Iron in the mixture.

When this photograph was taken, the gear was only partially completed. There remained the task of cutting 287 herringbone teeth into its circumference.

Right there are two very good reasons why many foundrymen use CHATEAUGAY in producing large or intricate castings, or those requiring considerable machining. CHATEAUGAY makes castings tough, strong and resistant to wear. It fills molds quickly—sets rapidly. It insures soundness, close grain structure and uniform cross-section density in castings of great mass.

By using CHATEAUGAY, the machinability of castings is substantially increased. You can mill, drill, turn or otherwise machine them easily and economically.

Let a Republic Pig Iron Metallurgist tell you CHATEAUGAY's full story of product improvement, output increase and lowered unit cost. He will tell you also why CHATEAUGAY is naturally better iron because it is made from naturally better ores—the high grade, magnetite, hard rock ores of the Adirondacks—ores classified among the finest found anywhere in the world. He is ready to call whenever you are ready to talk to him.

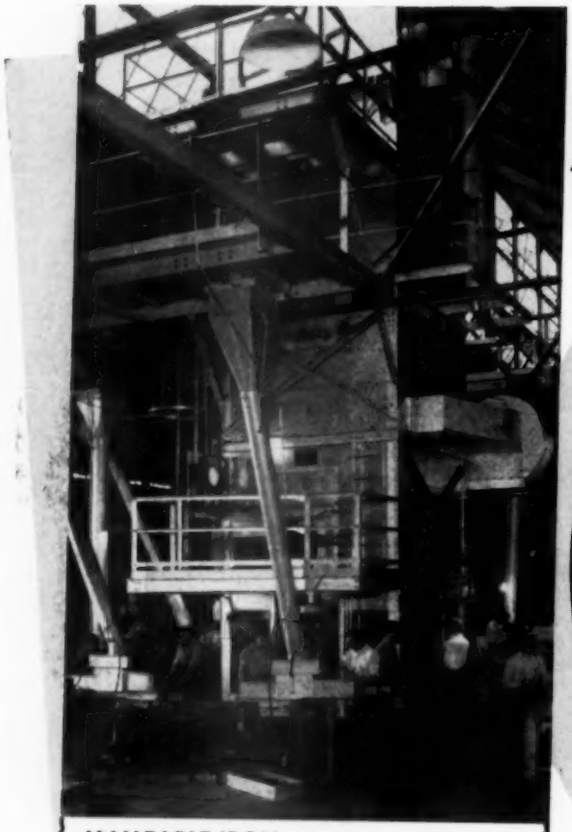
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

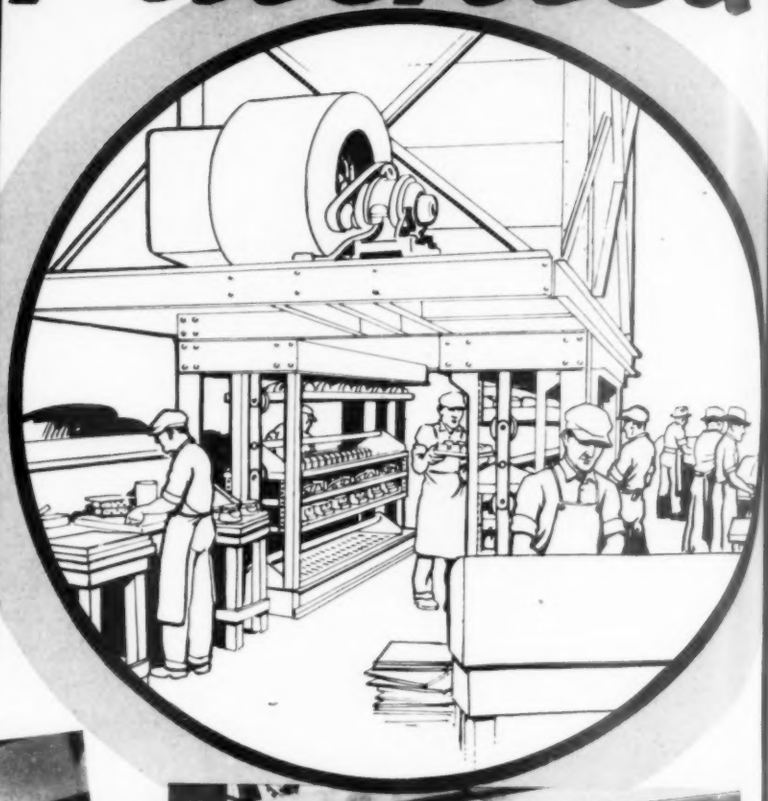
"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

Patented



MALLEABLE IRON. Note close grouping around this Coleman Tower Oven with Patented Open Loading Center.



MEEHANITE. Coleman Tower Oven in leading foundry producing Meehanite castings. Coremakers placed around three sides of Tower, with unloading of baked cores in foreground.

GRAY IRON. Another example of close grouping of coremakers around Coleman Tower Oven made possible by the Patented Open Center. Jobbing iron foundry.

COLEMAN
CORE *and* MOLD
OVENS

The **FOUNDRY E**
CLEVELAND 13 O

BUILDERS OF COLEMAN A

OPEN CENTER

Exclusive Advantage of

COLEMAN TOWER OVENS

THE PATENTED OPEN CENTER FEATURE makes Coleman Tower Ovens the fastest loading vertical ovens built. It permits loading from both inside and outside the Tower, thereby increasing loading accessibility by as much as 300% over other vertical oven designs. The center loading aisleway enables close grouping of the core-makers around three sides of Tower, saves many steps between bench and oven. Handling labor is reduced to a mere fraction.

COLEMAN TOWER OVENS IMPROVE WORKING CONDITIONS. Cores are cooled and "smoked-off" before they reach the unloading position, permitting immediate handling. No uncomfortable heat, acrid fumes or gases to interfere with worker efficiency.

COLEMAN TOWER OVENS BAKE PERFECTLY, eliminating the cost of rejects and make-over labor.

INVESTIGATE NOW! Ask us to give you full details and refer you to users. The verdict of leading foundries is significant.

CLOSE-UP of Open Center of large Coleman Tower Oven in aluminum foundry. Note accessibility of both "up" and "down" conveyor lines.

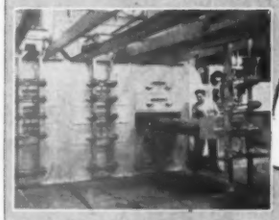
Coleman Ovens are also built in all conventional and special designs to meet every possible requirement in core baking and mold drying. Heating systems can be furnished to use the most economical fuel available in your locality—gas, oil, stoker coal, electricity, etc.

●

OVER 9,000 SUCCESSFUL INSTALLATIONS

WRITE FOR FOLIO OF BULLETINS

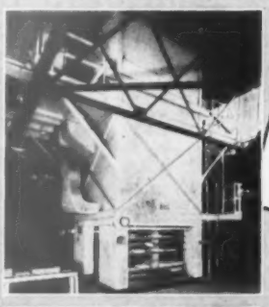
COLEMAN Portable Core Ovens



COLEMAN Rolling Drawer Ovens

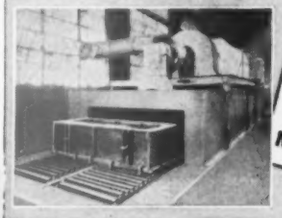
COLEMAN Transrack Ovens

COLEMAN Car Type Ovens

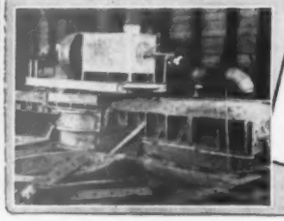


COLEMAN Tower Ovens

COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

RY EQUIPMENT *Company*

D 13 OHIO, U. S. A.

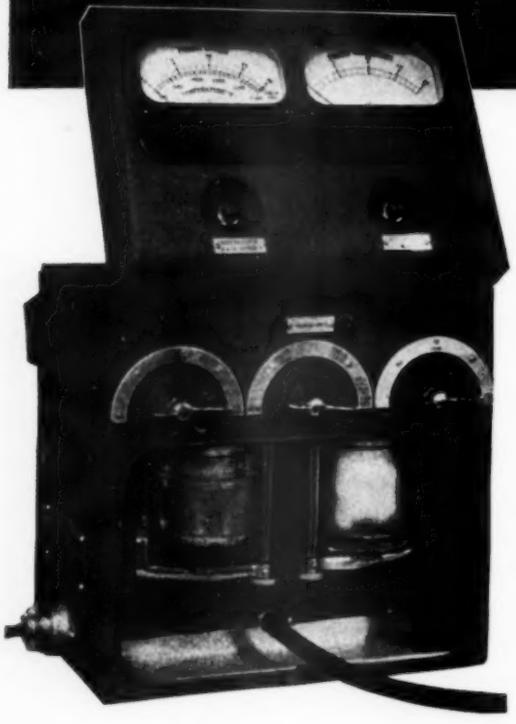
AN AND SWARTWOUT OVENS

MEMBER

How efficiently are you Burning Fuel?

YOU CAN FIND OUT – IN JUST A FEW MINUTES – WITH THE CITIES SERVICE

INDUSTRIAL HEAT PROVER



APPLIED to the flue or exhaust of any type of combustion equipment, the Cities Service Industrial Heat Prover analyzes spent gases — registers *immediately* on two carefully calibrated dials the exact percentage of unconsumed fuel and oxygen.

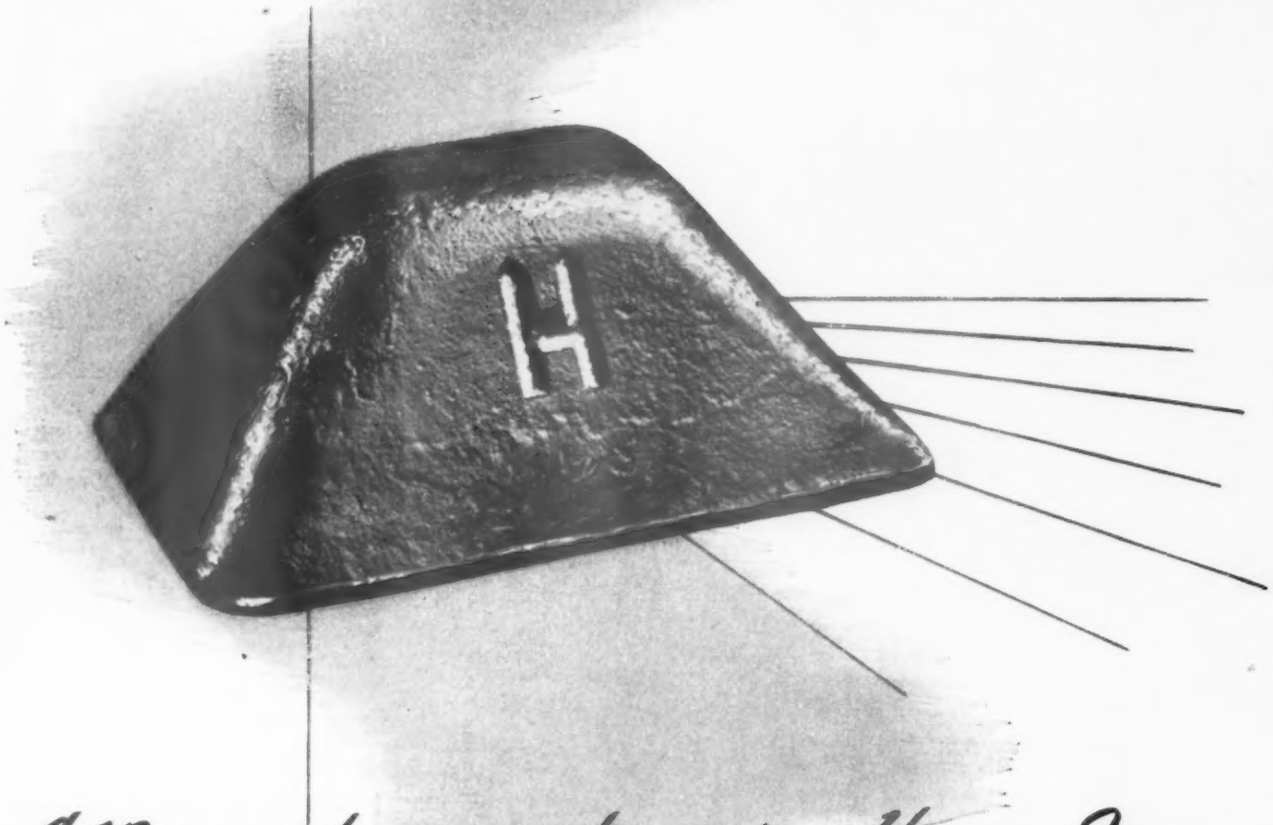
This unique instrument is especially recommended for checking brass, aluminum and non-ferrous metal melting furnaces. It will work equally satisfactorily for checking all types of annealing ovens and core ovens. It has been used with every kind of fuel and with every type of burning equipment.

For information leading to demonstration of the Industrial Heat Prover, contact your nearest Cities Service office. The service is free and there is no obligation. May we suggest that you write today.

CITIES SERVICE OIL COMPANY

Chicago • Cleveland • Detroit • St. Paul • Cedar Rapids
Kansas City • Tulsa • Fort Worth • Shreveport
Milwaukee • New York

HANNATEN IRON INGOT



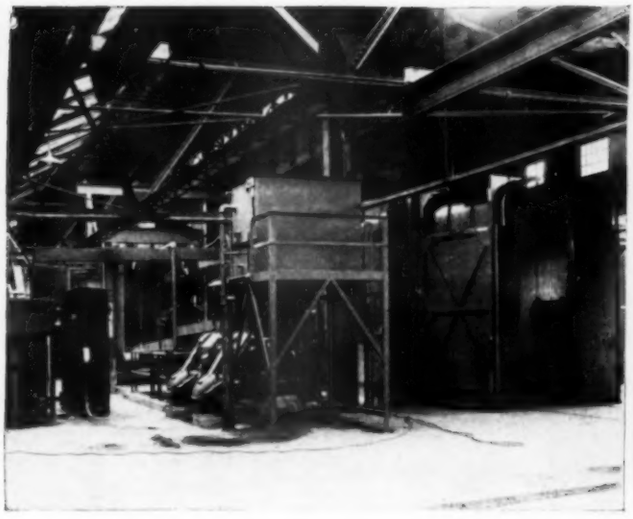
A 10 pound reason for using Hanna Iron...

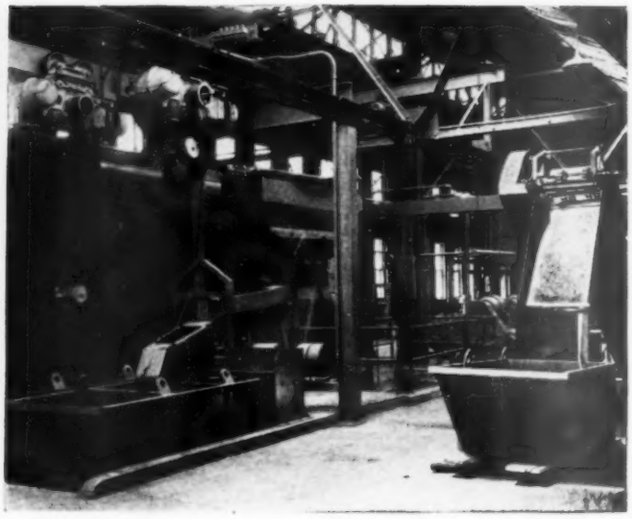
HannaTen iron ingots provide foundrymen with a better iron for better castings. Their convenient 10 pound size assures more accurate control of the charge . . . a more uniform melt . . . greater flexibility in foundry operations. At the same time, the finer grain structure of HannaTen ingots yields inherently finer-grained castings. Available in five grades, HannaTen costs no more than regular Hanna pig. Write or phone the nearest Hanna office for details today

THE HANNA FURNACE CORPORATION

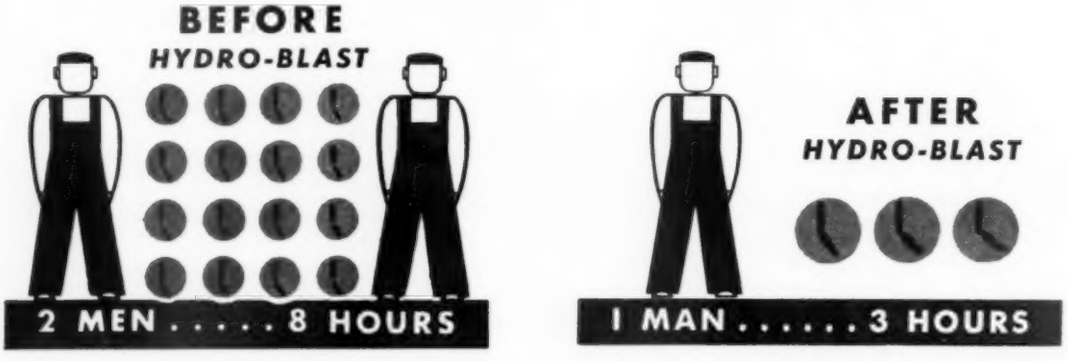
BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION





How National Transit
BLASTED CLEANING COSTS



FROM 16 man-hours *to only 3 man-hours:* that tells what happened to cleaning costs at National Transit Pump and Machine Co., Oil City, Penna., when Hydro-Blast was installed. The first casting cleaned was a large brass cylinder that formerly required two men working 8 hours to decore and surface clean. One Hydro-Blast operator did a far better job in only 3 hours. Plus benefits include elimination of dust, comfortable room temperatures and important economies through sand recovery.

National Transit manufactures Transit pumps and pipe line tools, Transit gas engines and compressors—pours both gray iron and non-ferrous metals. The result described is typical of their experience with Hydro-Blast—to their warm satisfaction.

You can win similar savings and advantages for your own business. It's easy to find out how—write Hydro-Blast.

HYDRO-BLAST

2550 N. WESTERN AVENUE · CHICAGO 47, ILLINOIS

FOR LOWER COST ELECTRIC MELTING

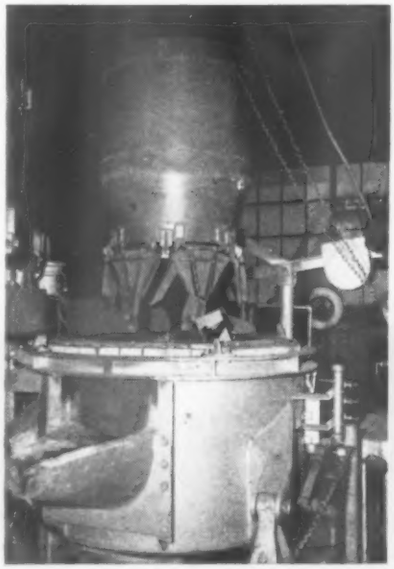
. . . HYDRO-ARC ELECTRIC FURNACES

Hydro-Arc Electric Furnaces have the latest developments of modern direct-arc melting or heating equipment. The hydraulic electrode positioning equipment available only with the Hydro-Arc responds quickly and accurately to every demand of the finest furnace regulator made to date. These two fine units, coupled together like twin links of a chain, give you

. . . Better Metallurgical control at less cost per ton
. . . Faster melting or heating
. . . Less line surging
. . . Better power factors

The popular electrode arm pioneered by Whiting Hydro-Arc permits slipping electrodes and adding new lengths without climbing over the hot furnace. This means

. . . Safety
. . . One man instead of two
. . . Elimination of poor electrode contact and consequent maintenance
. . . Minutes of furnace down time reduced to only seconds
. . . Lost time converted to productive time
. . . Less fatigue



The Hydro-Arc top charge is unique. Only the roof is raised prior to swinging aside. This relatively simple design has inherent desirable advantages offering

. . . Faster charging
. . . Less maintenance cost
. . . Simple standard equipment
. . . More heats per roof or side wall refractory

Whiting Hydro-Arc electric furnaces afford safer and lower cost production of better iron, or steel, or alloy castings. Write for Bulletin FY-130.

WHITING
CORPORATION

15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

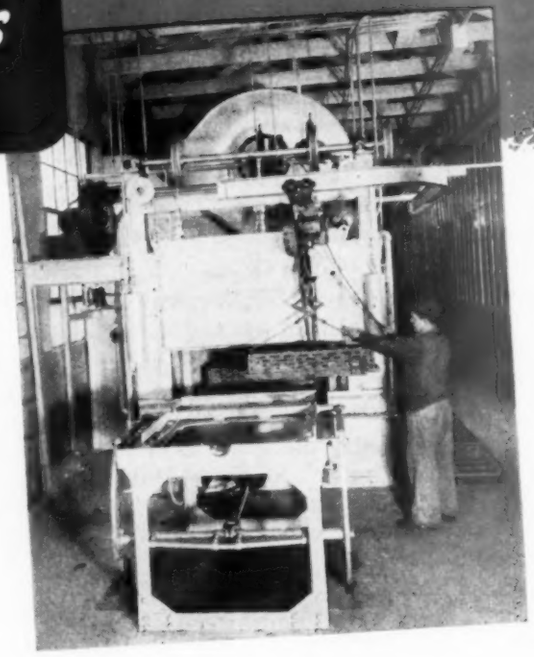
Building
INDUSTRIAL OVENS and FURNACES
for 53 years

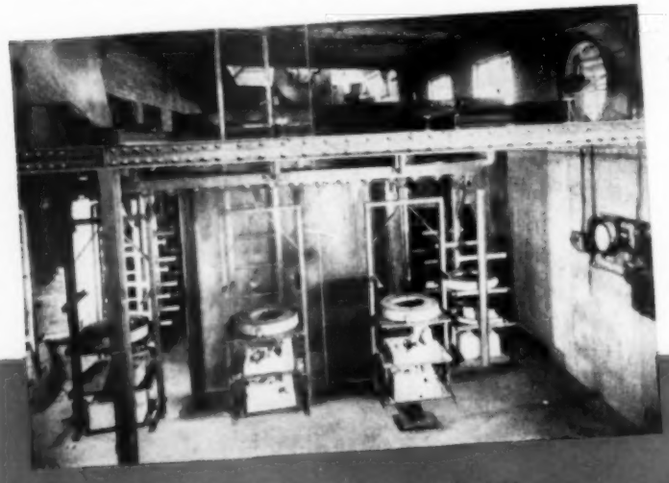
. . . has been our business

MAEHLER'S leadership in developing the recirculating air heat system for industrial ovens and furnaces has been recognized throughout industry for many years. The Paul Maehler Company has pioneered in this type of heating, the result of 53 years of experience which spans all of the methods from a coal stove in an oven serving bicycle refinishers to the complex systems of the present day.

Tests show that Maehler-engineered recirculating air-heat furnaces maintain temperature uniformity that is *virtually perfect!* This kind of temperature control assures the user of lower operating costs, greater production and more satisfactory results.

Regardless of what your requirements are . . . heat treating, core baking, enameling, etc. . . . Maehler engineers can help you design an oven, furnace or complete system to meet your needs.





These two photos show typical Maehler installations. The one above is a Maehler air-draw furnace at Chambers, Bering Quinlan Co. It is used to anneal gray iron castings. The installation at the left is a Maehler continuous monoveyer core baking oven, with Palmer-Bee conveyor, at the Howard Foundry Company. The cores are baked 2½ hours at 450° F.

Industrial Ovens and Furnaces
for Core Baking, Mold Drying,
Heat Treating, Enameling, etc.

MAEHLER
THE PAUL MAEHLER COMPANY
2208 W. Lake St. • Chicago 22, Ill.

ALSIFER

FOR MORE ECONOMICAL AND EFFICIENT DEOXIDIZING

Alsifer...a well-balanced, carbon-free alloy of iron, silicon and aluminum... is widely used in steelmaking processes as a degasifier and deoxidizer and to control grain size. Produced in modern electric furnaces under rigidly-controlled conditions, it is an exceptionally uniform product that can be depended upon for consistent results.

The density and chemical composition of Alsifer insure rapid and complete solution in the molten metal, giving high efficiency. Highly uniform performance and close grain size control are thus obtained from heat to heat. More even distribution, plus a slower, more thorough deoxidizing reaction, are reflected in a cleaner steel that is freer from surface defects as well as non-metallic impurities.

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

Alsifer is supplied in three sizes... egg... crushed... ground... to suit your requirements. Our metallurgists are ready to assist you in achieving optimum results with Alsifer.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

Ever suspect you're grinding away profits?

Grinding is a simple looking operation at first glance. But as you take a careful second glance, you're likely to spot low production rates, excessive wheel replacements—in short, profit leaks.

Men who figured they are too close to their grinding to get a candid viewpoint, and who have asked Peninsular engineers to take that "second glance" for them, have often been pleasantly surprised at the savings they've made.

No reason why you can't find out if similar savings could be made in your plant. Peninsular engineers are available for a careful study of your grinding operations. This study includes a thorough analysis of your equipment, of the material to be ground, and of all other important factors that influence costs.

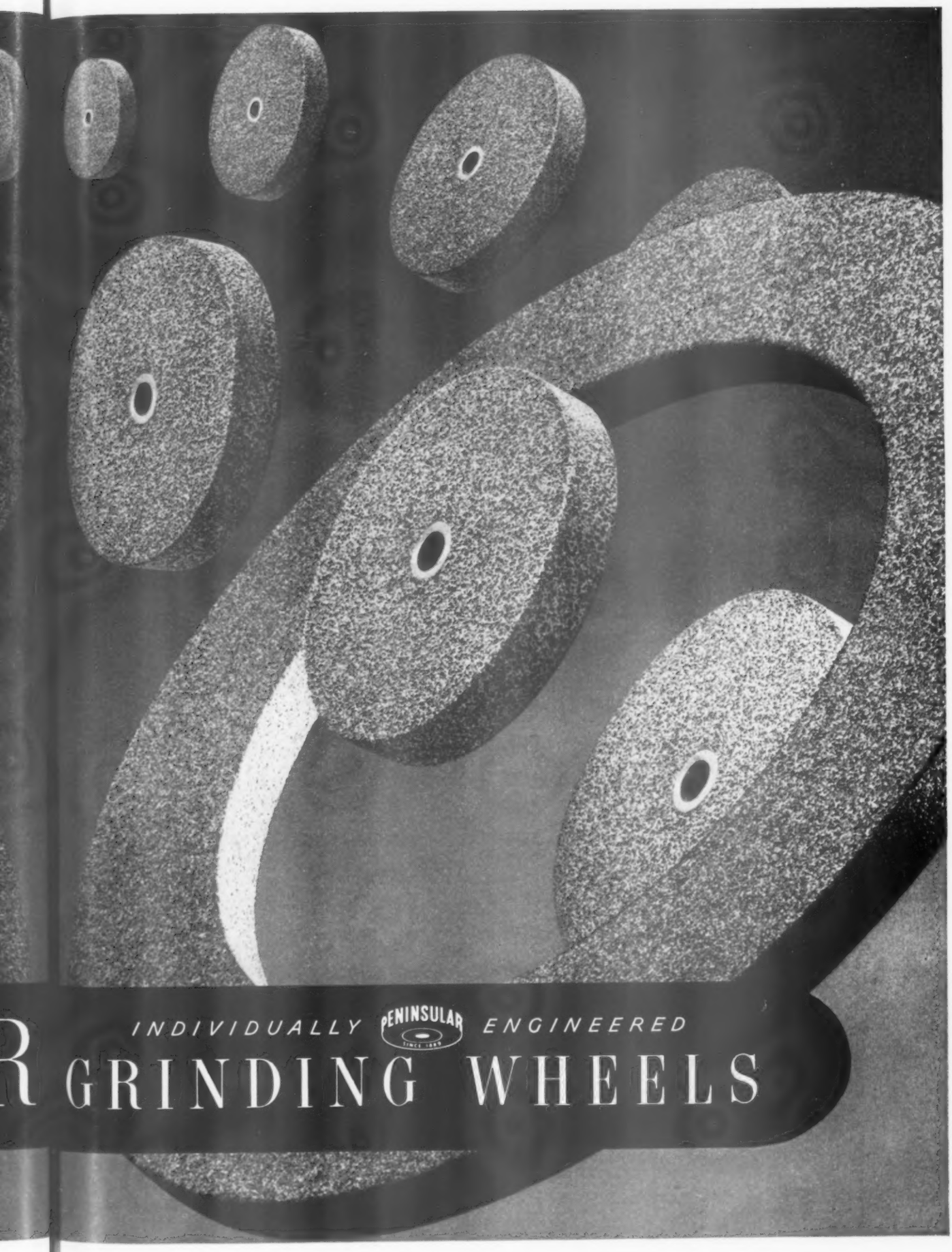
Their findings are used to develop a special formula and the proper shape for grinding wheels that are completely efficient for your work. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR G

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

Extra Hands···to Aid Industry—and You!

HANDLING COMPLEX PROBLEMS in the chemical process industries makes many a purchasing and production executive wish he had as many extra hands as this ancient Hindu idol to help him through—*and he has!*

THEY ARE HIS...and yours—in the cooperation and assistance of chemists, engineers, and technicians on General Chemical Company's Technical and Engineering Service staffs. These experts are well qualified by technical training and by practical industry-wide experience to offer sound, constructive advice in many ways—whether your problems deal with industrial, scientific or agricultural chemicals.

THEY CAN FURNISH pertinent data on properties, grades, and packaging of General Chemical products . . . advise on materials and methods for handling and storing them . . . consult on their applications to your operations...and work with you in the development of special chemicals to meet your individual requirements.

When "extra hands" such as these can help you, just phone or write to the nearest General Chemical Company Sales and Technical Service Office listed below.

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

Sales and Technical Service Offices: Albany • Atlanta • Baltimore • Birmingham Boston • Bridgeport • Buffalo • Charlotte • Chicago • Cleveland • Denver Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Providence • San Francisco • Seattle • St. Louis Wenatchee (Wash.) • Yakima (Wash.)

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Montreal • Toronto • Vancouver

YESTERDAY...

a sensational innovation

When hand flame cutting of risers was introduced to steel foundries, older operations were rapidly discarded. This method was one of the many ways in which the oxygen industry helped to cut costs in the steel foundry.

STILL LOOKING INTO THE FUTURE

TODAY... *what a change*

The oxygen industry went right on to develop an even better practice—machine flame cutting of risers. It's still faster, more economical—eliminates 75% of the grinding operation.

AND TOMORROW...?

Airco will continue its research efforts to contribute new and better methods of aiding steel casting production.

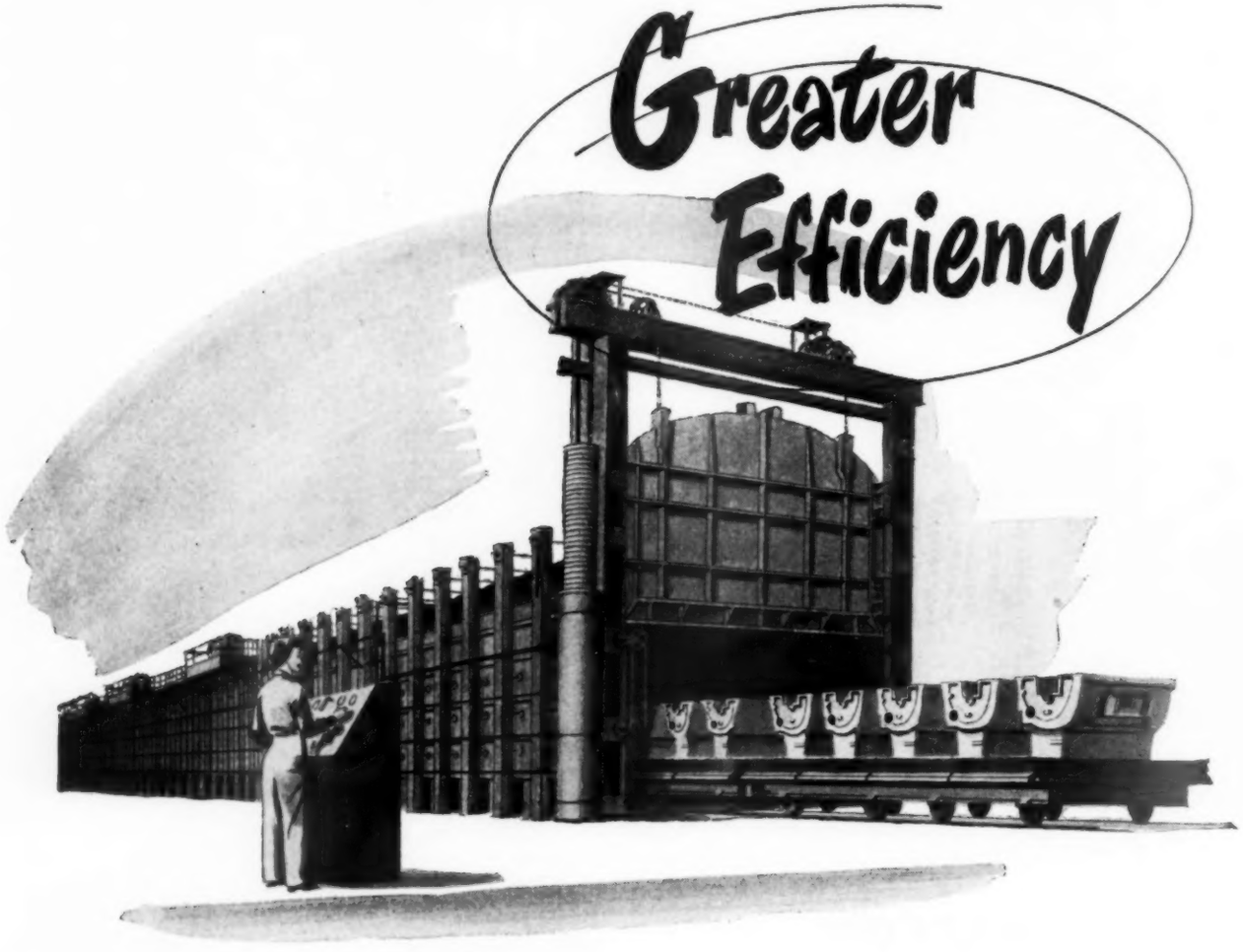
Airco's Technical Sales Division is at the call of steel foundry men in applying Airco processes in the solution of their problems. **A copy of an interesting booklet: "New and Improved Oxyacetylene Methods for Steel Foundries"—is available.** For your copy of the booklet, and for further information concerning Airco's Technical Service write: Air Reduction, 60 E. 42nd St., New York 17, N.Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR STEEL FOUNDRIES

One of the many advantages of GAS and MODERN GAS EQUIPMENT—



Management and production men appreciate anything which promotes efficiency. In addition to enhancing economies and profits, efficiency tends to make work more pleasant, easier and cleaner for personnel. Gas, then, should be considered as the prime fuel for industrial heat treating processes from the standpoint of increased efficiency.

Here are a few reasons why Gas is more efficient in production line heat treating: Gas is fast—it brings the required heat swiftly, reaching desired temperatures quickly and maintaining heat at the point demanded, for any length of time.

Gas is the most precisely controllable of any source of heat—it can be set at any temperature needed by the job and the operator is certain that such temperature will be maintained indefinitely. There is the dependability of Gas, too,—it is always there when needed, plus the vast knowledge and experience of Gas Company personnel, which is at your disposal.

Finally, Gas is economical—both in unit and overall costs, and in its contribution to better working conditions—reducing labor turnover and adding incentive through more pleasant surroundings. Look to Gas, then, for the more efficient production of better goods.

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

The **DALLETT LINE** *of Pneumatic Tools and Accessories*

Precision Built

Valve Type

Dallett Valveless

Chipping Hammer

Write for Pneumatic Tool Bulletin No. 100

Valveless

Safety Retainer Chipping Hammer

Scaling Hammer

Write for Pneumatic Chisel Bulletin No. 200

Dallett Pneumatic Tools are made in a number of sizes and designs for many specific uses . . . valve and valveless type, with button, lever or handle control:

Interchangeable

"Dalbo" Hose Ends

Dallett's—"Dalbo"—Air Hose Fittings and Couplings are machined from solid bar stock—are leak-proof—with safety locking sleeve.

Dallett chisels and blanks are made in most standard shanks—safety retainer chisels are available for most makes of small pneumatic tools.

Forged Tools

"Dalbo" Interchangeable Pipe Ends

"Dalbo" Couplings

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"Dalbo" Pneumatic Fittings

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Safety Retainer Chisels

PNEUMATIC DALLETT EQUIPMENT ACCESSORIES

ESTABLISHED 1883

THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.

Manufacturers of Pneumatic Tools and Accessories

Freddie always knew what he wanted

FRED WORKS FOR A LIVING NOW—KNOWS A BIT ABOUT GRINDING

THERE'S A "GENERAL" WHEEL FOR EVERY TYPE OF GRINDING OPERATION

For Snagging Vitrified and Resinoid Bonds
Trade Names—Aluminoid and Carbonoid

For Cutting Off Rubber, Resinoid and Special Bonds
Trade Names—Westaluma and Westcarbo

For Tool Room Work Vitrified, Resinoid and Rubber Bonds
Trade Names—Aluminoid and Carbonoid

For Polishing and Finishing
Three Grades of Soft Rubber Polishing Wheels
Trade Name—Diamond Brand

Aluminoid — Carbonoid
DIAMOND BRAND
Westaluma — Westcarbo

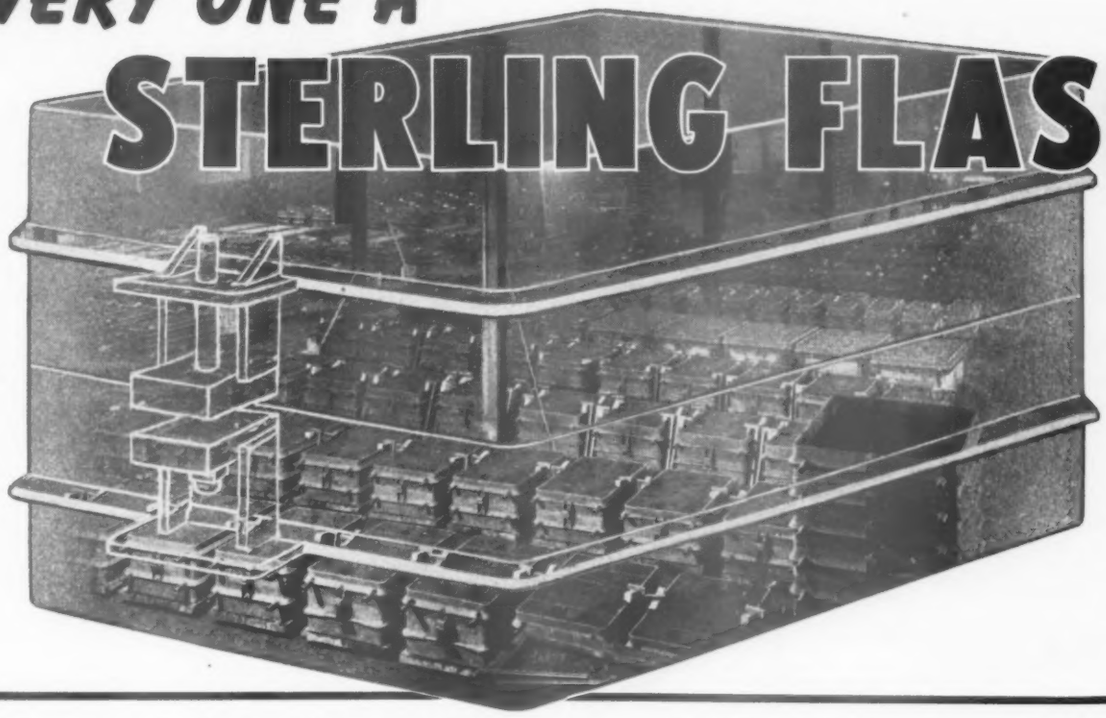
Fred works for a living now . . . he's a grinder. Fred's boss says, "He's one of the best grinders I ever knew. He likes his work, likes his job and even likes his boss." Fred told me what he wanted the first week he was on the job. He said, "Give me the wheel with the right feel. Get me a General!" Well, sir, I liked Fred's frank manner and I decided that as long as he wanted "Generals" we would try them. Now we've standardized on "Generals." Fred was right. Get behind a General Wheel yourself and see what I am talking about. Generals cut cooler, faster and they last longer, much longer than other wheels. Mister, when you feel a "General" bite into metal you know where you're going. There's no bouncing or vibration because "General's" arbor holes are molded to exact sizes and "General's" cut-off wheels are fitted with aluminum bushings that prevent spindle scoring and damage through careless mounting. Try a General today and you'll know what we mean when we say,

"'General' is The Wheel with the Right Feel."

GENERAL GRINDING WHEEL CORPORATION
(WEST ABRASIVES INC.)

3132 E. THOMPSON STREET, PHILADELPHIA 34, PENNSYLVANIA

EVERY ONE A STERLING FLASK



Foundries have learned that it pays to *Standardize* on *Sterlings!*

Sterling No. 116A Wheelbarrow with 3/16" steel plate re-inforcement for extra hard usage.

Sterling Style "LL" Flask with angle re-inforcement and two-man lift handles.

The vast majority of American Foundries . . . more than 4000 of them . . . have adopted Sterling Steel Flasks for greater efficiency, longer life and more profitable foundry operation. And these foundries continue to specify Sterlings whenever more flasks are needed. The reason is instantly apparent when you consider that Sterlings have the strength and rigidity to resist distortion and to take hard, every-day punishment in stride. All-steel . . . all-welded . . . Sterling Flasks are fabricated into one solid, rigid piece . . . capable of withstanding tremendous pressures. They retain their rigidity and accuracy year-in, year-out.

Consult Sterling the next time you are in need of flask service.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A5032-IP

FELLOWS ENGINEERED FOUNDRY PRODUCTION

Working model of Fellows match plate molding unit. Note compact arrangement of machines.

. . . produces 360 snap molds per hour, MINIMUM . . .

Here's a modern method of making molds from match plates. Unlike trying to fit existing machinery into established practices, the Fellows method and machines are *engineered* from a production standpoint.

UNSKILLED LABOR PRODUCES MAXIMUM PRODUCTION

Each of the operations in the Fellows method of making molds can be handled by an unskilled man. Further, as a unit, these unskilled men will produce more molds than experienced men have heretofore been able to produce with conventional methods.

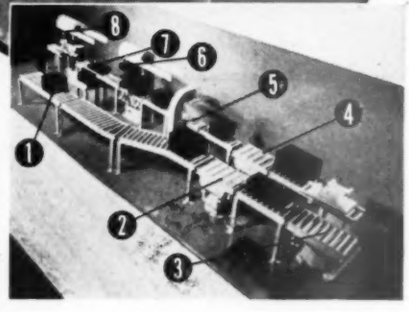
MAXIMUM PRODUCTION REGARDLESS OF SIZE OF FLASK AND NUMBER OF CORES

Patterns can be run over this unit as many times or as few times as the daily production schedules require. The unit can also be filled with duplicate plates of the same pattern. Short and long runs can be produced at the same production rate. Large molds are produced as rapidly as small molds.

ACCOMMODATES PRESENT PATTERNS AND FLASKS

There's no need for new patterns and flasks for producing snap molds at high production. The Fellows method and machine will accommodate your present equipment.

HOW TO APPLY THIS UNIT TO YOUR FOUNDRY . . . is described in this new booklet. How the unit fits into standard handling systems is clearly illustrated and described. Write for your copy today. Ask for bulletin No. F-946.



SEQUENCE OF OPERATIONS

The following is a brief description of the sequence of operations for producing molds by the Fellows method. Note how each operation is simplified. More complete data is included in the free booklet.

1. Assemble pattern and flasks.
2. Make drag half of mold.
3. Add bottom boards, clamp and rollover.
4. Make cope half of mold.
5. Add squeeze board, squeeze and remove board.
6. Draw cope and pattern.
7. Set cores.
8. Close mold, strip flask.

SIMPLE MOLDING UNITS F COMPACT EFFICIENT

THE FELLOWS CORPORATION

1012 NORTH THIRD STREET • MILWAUKEE, WISCONSIN

SEE YOUR PRODUCT IN ACTION WITH MICRONEX

You can use Micronex in a great many different ways to learn more about internal structure and motion.

This is possible because Micronex generates x-rays so powerful and so fast they can penetrate one inch of solid steel in one millionth of a second. And you can use it right down the line to get all types of data:

High-speed cutting tools can be stopped to give you an instantaneous picture of their action.

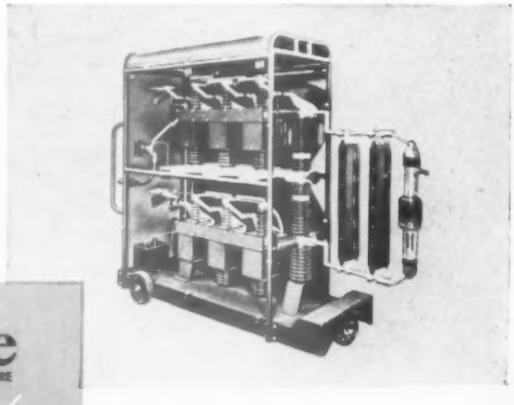
Shaft action within a bearing can be analyzed accurately.

Life and behavior of oils can be plotted when you know how and where they break down.

Metal stresses in forming, spinning or forging can be checked to improve production.

Basically, Micronex operates on the surge-generator principle, building up great reserves of power which are released in one instantaneous burst to activate the x-ray tube. It is this great power that lets you look inside any material or process. Get the full story now from your nearest Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-08174

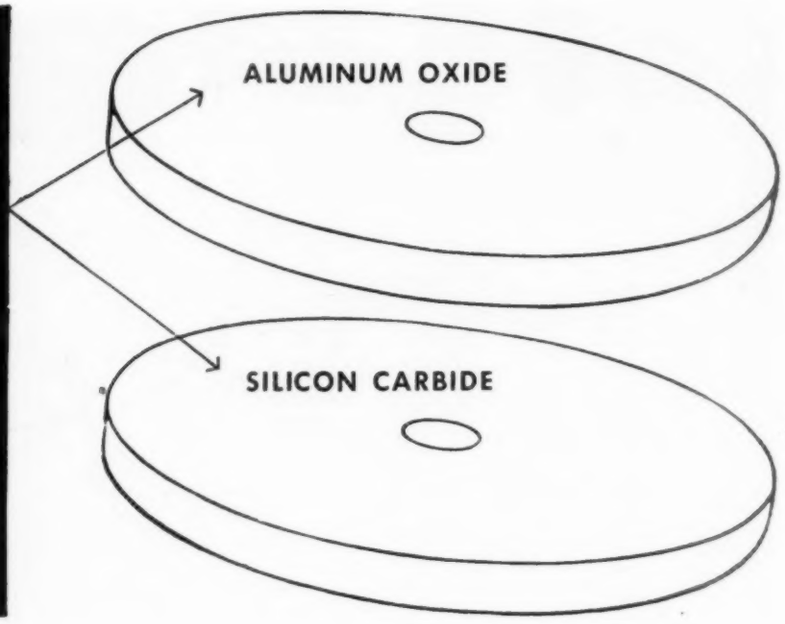


Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Electronics at Work

Which Abrasive is right for the Job?



WHEN adequate consideration is given grinding cost figures accounted for in wheel life, man hours, power consumption, volume and quality—selecting the best abrasive to use assumes new importance.

Aluminum Oxide and Silicon Carbide are the two most widely used abrasives. In many respects, characteristics of each differ widely. The degree of variation is further extended in the many modifications of each type.

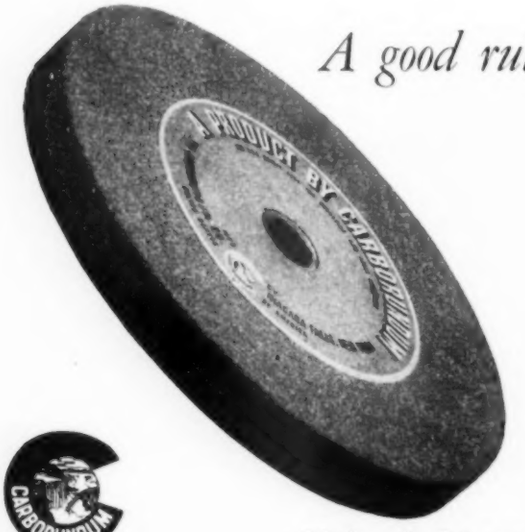
To choose one of these types of abrasives only on the basis of the material to be ground is not enough. Other variables affect the selection. Among these are contact area of wheel and work, amount of stock to be removed, and type and condition of the grinder.

To render practical aid in correctly evaluating these and other factors, as well as to serve as a double check on your choice, The Carborundum Company has organized a system which many successful concerns depend on for improved grinding, at lower cost.

A CARBORUNDUM salesman or our distributor's representative is your first contact with this system. These men personally can offer worthwhile suggestions based on a knowledge of current abrasive developments, plus plenty of on-the-job experience.

When the problem calls for an unusual solution, one of our Abrasive Engineers is called in. A trained specialist, he is supported by the findings of the world's best known abrasive laboratories.

Because you are interested in better grinding at lower cost, it makes sense to take advantage of this practical, easy-to-use service. Whenever you have an abrasive question, feel free to call in CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.



A good rule for good grinding... **CALL IN**

CARBORUNDUM

TRADE | MARK

BONDED ABRASIVES

WHEELS
Silicon Carbide
Aluminum Oxide
Diamond

Cylinder Hones
Sticks, Stones & Rubs
Specialties

COATED ABRASIVES

Paper, Cloth and Combination

Sheets, Rolls, Discs

ABRASIVE GRAINS AND COMPOUNDS

for:

Polishing
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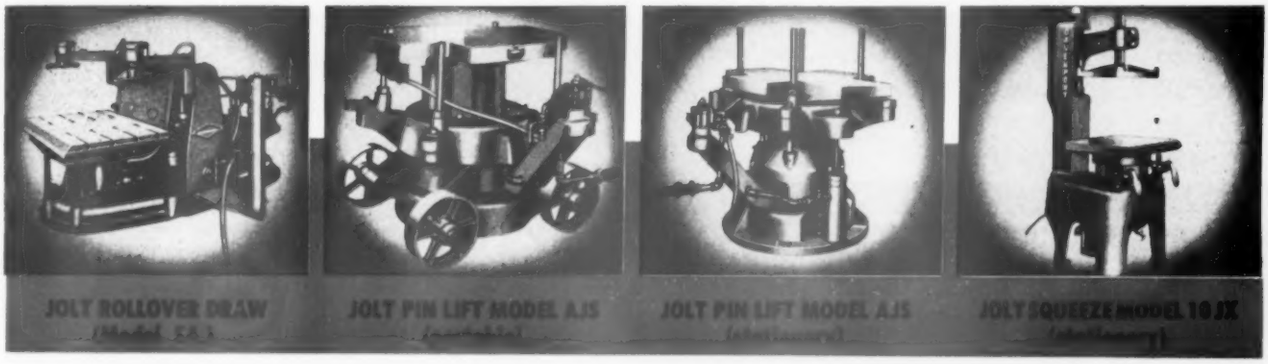

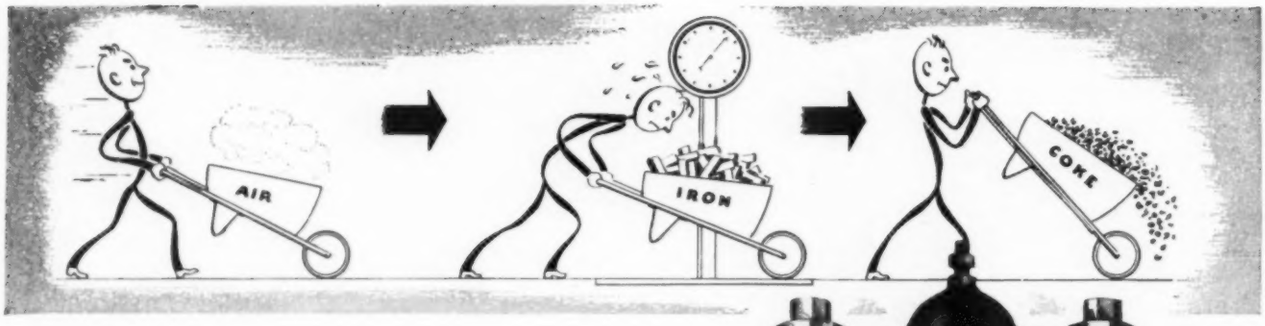

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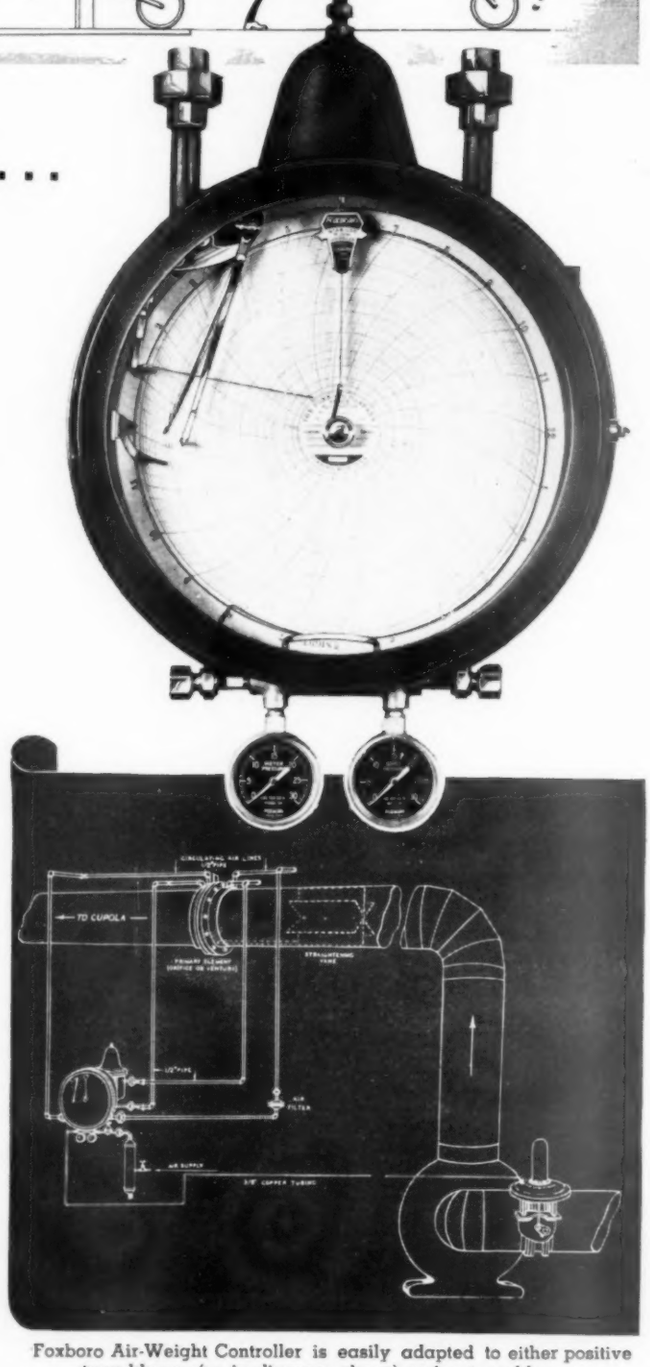

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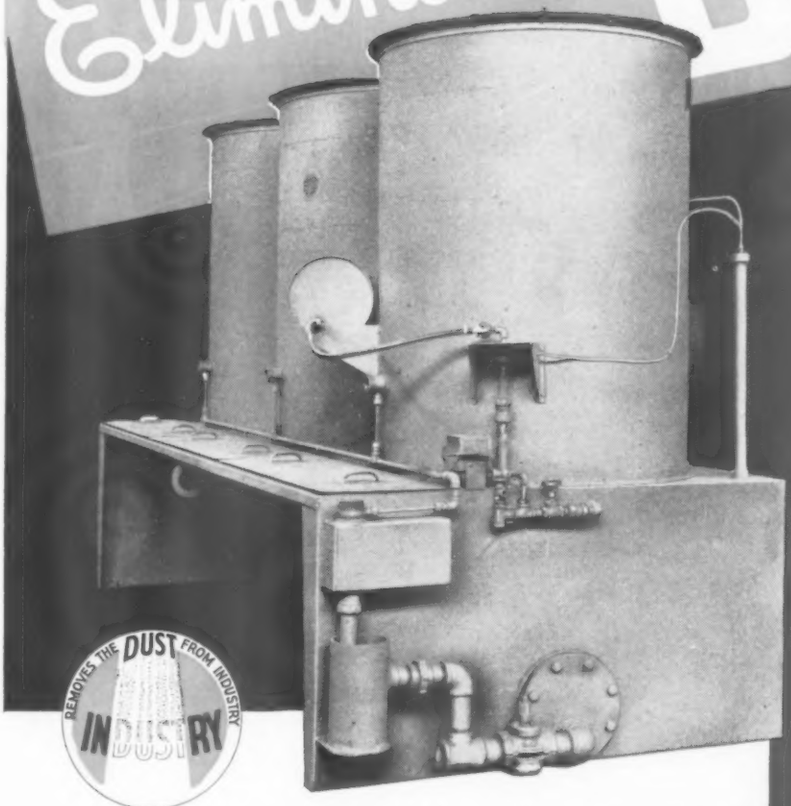

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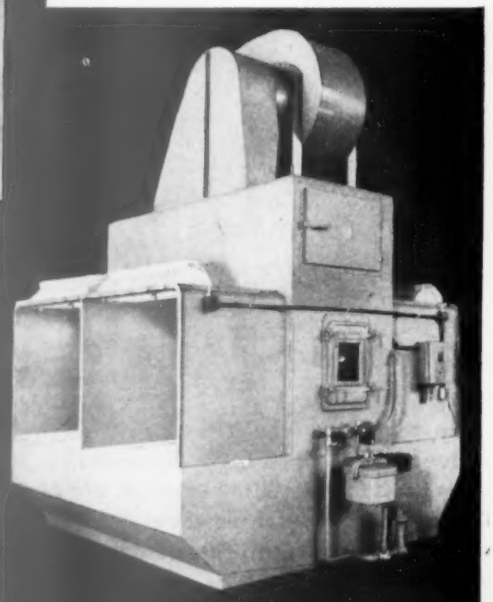

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Chapters Spearhead AFA Growth and Influence

THIRD annual conference of chapter chairmen, held recently in Chicago by the American Foundrymen's Association, emphasized again the tremendous contributions of the chapter movement to development and growth of the association. Since the first chapter was proposed in 1933 and organized at Chicago the following year, membership in the association has increased better than fourfold. Reports given to the chapter chairmen show 8539 companies and individuals were members on June 30, by far the highest total in the fifty-year history of the organization. Since 1941 the membership has doubled, and during the past year the gain has been 727 members. Importance of chapters in membership growth is illustrated by the fact approximately 91 per cent of all members belong to chapters. Considering just the members in the United States and Canada, 95 per cent are affiliated with chapters.

In the 11 years since the first chapter was organized, major contributions of chapters to association progress have not been confined entirely to increasing membership of the AFA. During the fall, winter and spring each of the chapters holds seven or eight monthly technical meetings. In all probability more foundrymen now listen to technical talks and participate in foundry practice discussions each month than enjoyed such advantages in an entire year before chapters became a vital part of AFA development. When some chapters can draw an attendance in excess of 1000 for such functions as summer outings, ladies' parties and Christmas parties, the social values of AFA chapters also cannot be overlooked or discounted.

Chapters are contributing greatly to foundry progress in the various local districts. For example, educational committees are devoting time and energy to furthering apprentice training and the improvement of foundry education in trade and engineering schools. One chapter recently was active in an election where the voters adopted a bond issue to build a new trade school. Needless to say, the school will feature a modern foundry and pattern shop, as well as excellent courses of study for molders and patternmakers.

If foundrymen will review the many contributions which chapters have made to the foundry industry, and will consider the potentials for future service to progress in the manufacture of castings, a vote of appreciation will be given to those leaders of the old Chicago Foundrymen's Club who first saw the possibilities of further developing the AFA through the chapter movement, and then sold the officers and directors on establishing such a program.

THE FOUNDRY takes this opportunity to salute those pioneers, as well as the men who have carried the banners of the various chapters since that time, and the present officers and directors who are now planning the programs for what promises to be the most successful year in chapter history.

Frank G. Steinbach
Editor

PATTERN VAULTS Require

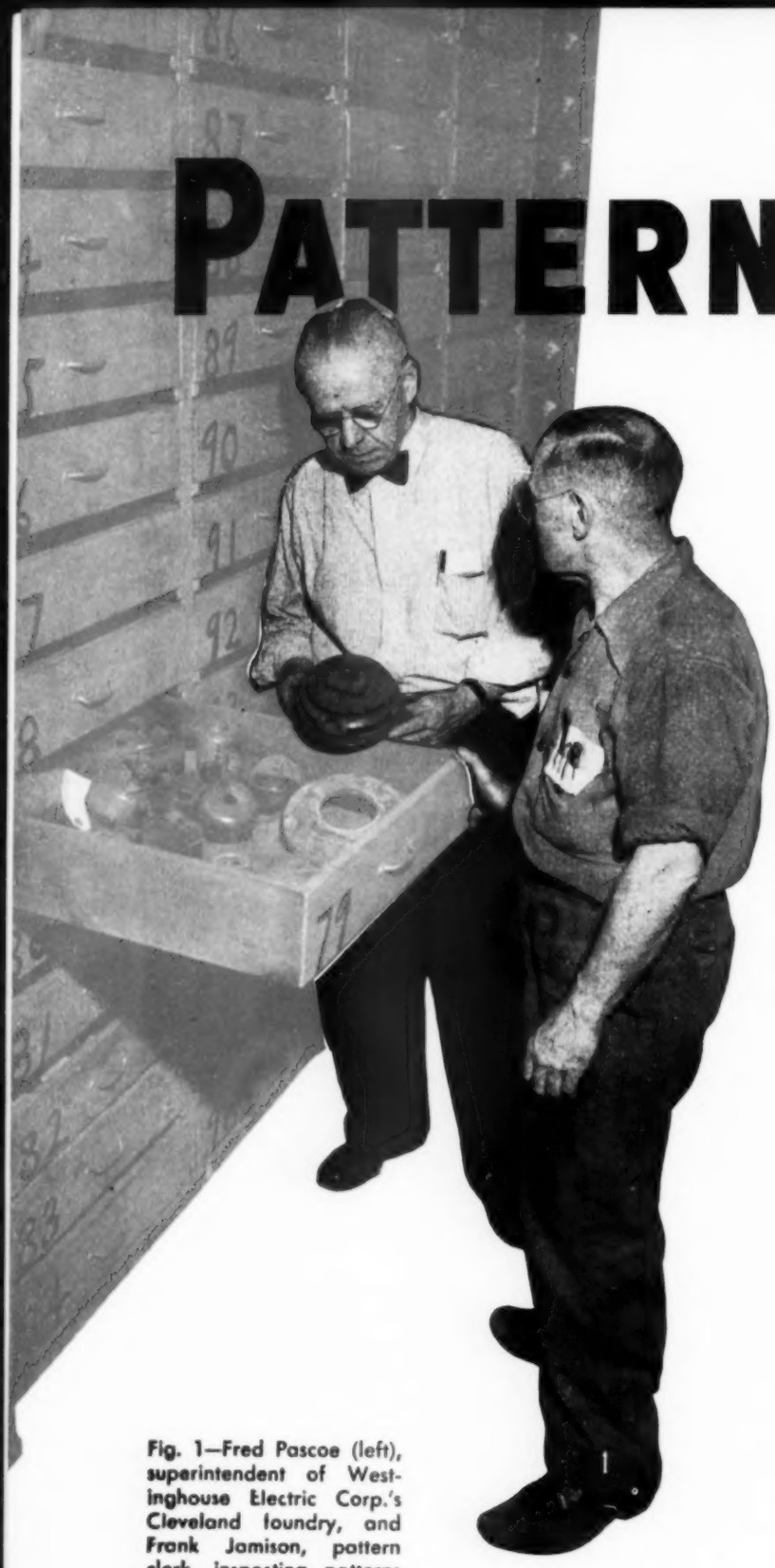


Fig. 1—Fred Pascoe (left), superintendent of Westinghouse Electric Corp.'s Cleveland foundry, and Frank Jamison, pattern clerk, inspecting patterns stored in drawers. Elimination of openings between drawers would make them dust proof

Fig. 2—This type of wall—a combination of tile and brick—is highly recommended for use in constructing pattern storage vaults

EAGERNESS for mass production in record time has caused industry to plan, tear down and rebuild its factories. The same eagerness has made industry pattern-conscious, since quality and volume of casting production is affected markedly by the kind of pattern equipment that is supplied the foundry. Safekeeping and maintenance of this pattern equipment has created considerable interest in pattern storage vaults that house the wood and metal pattern equipment.

To be able to locate a pattern quickly, whether it be within industry's own plant or at an outside foundry, saves time in having a casting order filled. But locating the pattern is of small value if the pattern is hard to get at because it is buried under many others, or if loose pieces or parts of the pattern or corebox have been mislaid or lost. Slow, laborious or outmoded methods of handling patterns in and out of storage can cause expensive and time-consuming delays.

In planning a new storage vault, the men who are directly concerned with the patterns—whether it be in their design, making or handling—should be consulted. Included would be the chief draftsman or engineer, the patternmaker, foundry and coreroom foreman and pattern storage clerk. A conference of these men, or at least an individual consultation with each one regarding this problem, would save many a later headache.

This article is not concerned with recommendations for building a specific pattern vault, but rather with analyzing the various factors involved in storing patterns, thereby suggesting information which might be used to solve individual storage problems.

The storage problem varies somewhat in each of the following industries:

1. A manufacturing industry engaged in the production of an item such as a lathe. The lathe involves component parts of definite size and type that permit standardized storage of a more or less permanent nature.

2. A foundry that is also engaged in minor manufacturing involving chiefly castings (as a furnace line). In this case definite storage requirements are encountered but, in addition, storage facilities must be provided for job casting from patterns of unknown sizes and shapes.

3. A strictly jobbing foundry that must house

By FRANK C. CECH
Cleveland Trade School
Cleveland

e planning

pattern equipment of a transient nature. The storage facilities must be flexible so as to accommodate pattern equipment of varying design, types and sizes. Orders for one-off, intermittent or protracted runs provide a problem made worse by customers' neglect in requesting the patterns' immediate return after completion of the casting order.

Pattern Storage Units—*Open Shelving:* The conventional pattern storage is of the open-shelf type. The material used for the shelves may be wood of 1-in. stock (Fig. 9), sheet metal or coarse wire diamond shaped mesh of 1½-in. opening. All shelves are well braced to prevent sagging. Wood shelving is not recommended as it increases the fire hazard, many insurance companies taking this into consideration in writing coverage and some refusing coverage because of it. Heavy wire mesh (Fig. 8) is the best material for shelving as it tends to prevent accumulation of dust, permits light to filter through and exposes to view the patterns above and below the line of vision; and in case of fire it allows the water to run freely from one shelf to another onto the patterns stored below.

The framework for this shelving is of wood, pipe, angle, T-bar or channel iron construction. The shelving generally is 4 to 6 ft in width, thus putting the stored patterns within arm's reach. The sections are separated from each other by 4-ft aisleways that run the length of the pattern vault. It is customary to break into these aisles or runways occasionally with transverse passages to make freer movement possible within the pattern storage. Ready access to the patterns and easy trucking through the aisles from the pattern storage to the foundry, pattern shop and shipping department should be kept at all times. Distances between shelves vary to suit the patterns to be stored, 18 to 20 in. being common.

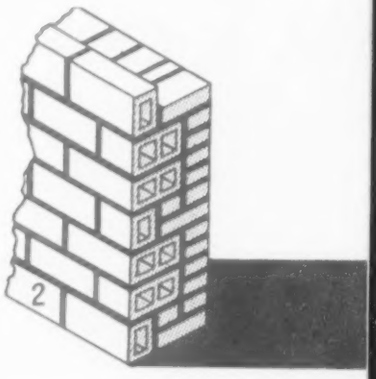
Bulk Pilings: Bulk piling is a term used to designate storage that covers more floor space than available shelves would permit, since an equal amount of storage on shelves would be scattered over a long stretch of shelving. Bulk piling is used for large patterns having numerous coreboxes or loose pieces, also for special patterns, their coreboxes and suitable flasks and mold boards that are expensive to duplicate and consequently must be kept (even though much space is required) in storage. Bulk storage consists of neatly piling the pattern equipment, especially the coreboxes, one on top of another. The compact piling of the entire equipment is possible because it must all be moved for a casting order at the same time.

Storing is done on the floor proper or on a specially constructed mezzanine floor or large shelf 6 to 8 ft above the ground floor, as shown in Fig. 7. This type of storage is also used to spread out patterns awaiting incoming orders or their quick disposition; to allow quick scheduling of patterns for foundry production or coreboxes for a coreroom production; and for recognition at a glance of patterns for return shipping after an order has been filled.

Drawer Storage: Considerable difficulty sometimes is encountered in storing small patterns. In this case the word "small" refers to patterns of such a size that often two or three could fit into a kitchen match box, and includes patterns up to 5 or 6 in. in maximum dimension. These patterns, because of their fragility, are likely to be broken unless carefully stored. If stored on open shelves they are easily swept off, and in the case of wire shelving of a coarse mesh may fall through unnoticed, thus being lost at least temporarily.

The best storage for this type of pattern is a drawer or bin arrangement (Fig. 1). The drawers may be of thin plywood or light sheet metal made to slide in drawer racks such as office filing cabinets or the cheaper transfer files. Bins may be constructed of heavier plywood or ⅞-in. lumber stock. Although not generally used this method of storing patterns has its merits as it is protection against dust, breakage and misplacement and forms readily accessible storage.

Storage Racks: Storing in racks (Fig. 3) is economical of space, yet permits ready accessibility to the patterns. It might be termed a specialty storage used for gated patterns, plated patterns, matchplates and the smaller cope and drag patterns. Two methods of storing are used. One is to hang by the gated patterns themselves or by the matchplate lugs; the other is by sliding the plates into grooves that keep the patterns in separate compartments. Additional storage space must be provided for sand matches and follow boards where they accompany the gated patterns, if the storage is the vertical type. Needless to say, storage of this type is best suited to pattern plates of a uniform size.



Open Storage Wells: Where a pattern storage building enjoys a high ceiling it is comparatively easy to arrange the shelving in tiers running around the walls, leaving a center portion open for the full building height to form a well. Where the ceiling is low and the building contains more than one floor the same effect is obtained by omitting the floor between two or three stories, thus forming an arcade effect. This center portion is used to store on end long patterns that are comparatively small in diameter, such as street lamp standards, columns,

bases and rolls or cylinders and their coreboxes, such as shown in Fig. 4. Much space can be saved by this means of storing. Some prefer to use the full ceiling height at the end of the pattern vault rather than in the center.

Factors Affecting Type of Storage—As already outlined, five types of storage are available, namely: Open shelving, bulk piling, drawer or bin storage, storage racks, and open storage wells. It is well at this time to review the factors that affect the choice of one of these five types of storage for patterns. Without this review and because of the staggering variety of patterns made, storage of patterns becomes a hopeless mass, literally as well as figuratively.

The following suggested classification is offered in an effort to untangle the aforementioned mass of patterns.

Size: The variety of sizes of patterns is probably the most outstanding storage feature. Consider which of the patterns may be cared for in turn by: First, open storage wells; second, bulk piling; third, open shelving; fourth, drawer storage.

Weight and Bulk: These features necessarily make it advisable to use a form of storage that will require the least amount of handling, such as open shelf storage on a ground level, or bulk piling. It is simplified by the availability of modern plant equipment such as chain hoists and lift trucks or additional help for the pattern clerk from plant labor or rigger gangs.

Foundry Production Features: First there is the distinction made between a loose pattern, which is commonly used in limited foundry orders, and a production pattern used for repeat or continuous casting orders. A loose pattern is a single pattern made to fill a specific order. As such it may be cared for by any of the five types of storage. A production pattern may be a single pattern or a multiple pattern. When it is a single pattern the odds are that it will be designed for high production, consequently different from the single pattern made to fill a specific order.

Production patterns start with master patterns. The latter seldom are stored but where storage is advisable it will generally fall into either the open shelf or drawer or bin storage type.

Because of the reduced cost of matchplates through pressure casting methods and the quick service made possible by their use, matchplates are being used for even short run casting orders. However, their uniformity in size makes storing rather easy as discussed under *storage racks*.

Plated patterns, cope and drag patterns are generally made of metal, or at least are mounted on metal rigging. Consequently the size and resultant weight decide whether they are adaptable to rack storage as matchplates or to ground floor open shelf storage.

Use of follow boards or sand matches is associated closely with shell patterns, which are fragile and generally either of the master or metal pattern type. Storage is of open shelf type.

Sweep, skeleton, segmental and sectional patterns are predominantly for large work and their storage is of the bulk piling type.

Stripping plate patterns generally are rigged on special machines and stored intact as a unit by themselves.

Foundry accessories such as core gages, bed-in boxes, etc., are stored along with the corresponding patterns and coreboxes usually on open shelves

Pattern Storage Building or Vault—The more thought that is given to the pattern storage problem in preparing specifications for the building, the less moving, adjusting and changing of the physical equipment within the building will be required after the structure is completed. Following are various factors which should be considered:

Location: Three considerations should be made before deciding on the location of the pattern vault. First, have it as close to the foundry as possible. Time and energy will thus be saved in getting the patterns and coreboxes to the foundry and coreroom and back to storage again. Second, for the same reason the vault should be close to the receiving and shipping room. Third, the building that houses a pattern shop on the ground floor may be designed to have the basement and upper floors used as a pattern storage.

This arrangement is ideal as the pattern clerk, being in the same building with the head of the pattern department, may readily consult with him when necessary to determine whether all of the component pattern and corebox parts are with the job. Should some of them be damaged, they can be taken care of easily without undue handling and waste of time. Patterns made within the building are shipped from it to their destination. Patterns shipped in from outside sources may be received here and checked for accuracy and moldability before being sent on to the foundry. Patterns returned after a foundry run and awaiting storage are checked for missing pieces and coreboxes as well as for necessary repairs. In this manner the pattern equipment always is in good order and no unnecessary delays are encountered in casting production because the pattern equipment is not ready for shipping.

Size: Size of the pattern vault must be computed from the number of patterns owned, the number of these to be stored, the type of storage decided on and the probable business expansion. Some of the vaults visited measured 60 x 85 ft, 70 x 70 ft, 80 x 100 ft, covering 5000 to 8000 sq ft of floor space, and many include several stories in height.

Height of the building depends on the means adopted to reach the upper shelves. The common ladder is slow and inadequate, besides being dangerous. Use of elevators and rolling stairs will be described later. To eliminate use of ladders and avoid constructing a two-story

building, the Crucible Steel Casting Co., Cleveland, has a platform or runway built around the shelf storage, as shown in Fig. 6. This makes all stored patterns within easy reach of the pattern clerk.

Building Material: The question of the building material to be used in constructing a pattern vault should be decided only after due consideration is given to several factors affecting patterns and pattern storage. First and of primary consideration is the cost involved in the building construction. Pattern equipment, however, is expensive and in the case of a manufacturing concern the pattern investment may easily run into hundreds of thousands of dollars. Threatened loss of this equipment either at the hands of the owner or a party such as a foundry to whom it is temporarily entrusted for safekeeping changes the storage building cost consideration from primary to one of secondary importance.

Most patterns and pattern equipment still are made of kiln dried or well seasoned wood. Pattern coatings also are of highly inflammable material; therefore the building should be fireproof. Granting or rejecting of fire insurance policies covering the value of pattern equipment may hinge on the type of vault construction. Irrespective of this, the fact remains that at least the insurance rates will be affected by the building construction and in certain cases might be prohibitive.

Wood, because of its cellular structure, its affinity for moisture and its hygroscopic properties, changes in dimension and shape. Consequently, pattern lumber is stored within the pattern shop so that it may be acclimatized prior to its use for patterns. To minimize the changes

Fig. 3—These storage racks for matchplates are located on a mezzanine in the foundry adjacent to the molding department, rather than in the pattern vault. Vertical storage would reduce dust accumulation

Fig. 4—Long patterns may be stored vertically, as shown here at the end of the storage building, instead of on shelves

Fig. 5—Rolling stairway makes it easy for George Gladdish, the C. O. Bartlett & Snow Co., Cleveland, to select a pattern from upper storage shelves. Counterbalanced steps swing up and out of the way when not in use

likely to occur after the patterns are made and while they are in storage, changes in humidity and temperature of the building should be controlled as much as is possible within reasonable cost and labor upkeep.

In the case of metal patterns no such changes occur, but oxidation and corrosion, due to humidity and temperature changes, set in. While no appreciable differences in dimension and shape are noticeable, the pattern surface is likely to become pitted. This makes the patterns difficult to draw smoothly and so affects the moldability of the pattern.

Walls of the pattern vault should be of a material and so constructed that the building will be insulated against the passage of heat and cold. A wall structure of brick and tile, as shown in Fig. 2, permits a minimum change in temperature and humidity. Less expensive, though highly recommended wall materials are concrete blocks. However, when these blocks are used the outside walls should be covered with a cement wash or waterproof paint to obtain maximum insulation against weather changes. Floors should be of concrete. Plank floors only serve to act as fire hazards and in case of fire could easily form fire traps.

Stairs and Elevators: Pattern storage buildings range in height from one to several stories, four and five floor storage being quite common. Stairs and elevators should be of fireproof material, located outside of the building proper or in a stair hall separated from the rest of the building by a fire wall. Use of stairs to supplement elevators is an additional safeguard to both patterns and storage personnel. The ground floor should be elevated to truck height, or a depressed drive built to lower the top of the truck to floor level for easy loading of large or heavy patterns. All material used for stairs, elevators and doors should be fireproof.

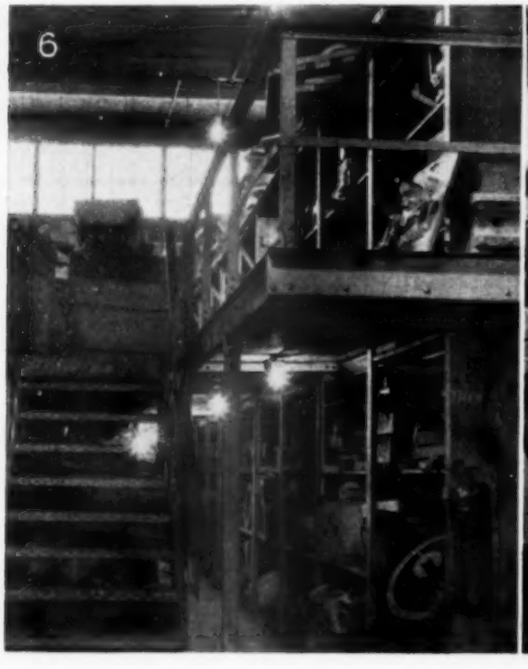
Rolling Stairways: Storage buildings of one floor with a large floor area and high ceiling sometimes are preferred to a multistoried building. The high ceiling will accommodate additional tiers of shelving. The old method of reaching the higher shelves by a portable ladder has given way to a rolling stairway (Fig. 5) that may be pushed to any desired location in the runway. It is more comfortable, easier to handle and the lower section of 7 or 8 ft is made to swing out of the way when not in use.

Hoists and Lift Trucks: Handling of patterns is expedited by use of chain hoists and lift trucks. For the well type storage or high ceilings, cranes are used to good advantage. Mechanical means of handling the patterns saves time, especially when a manpower shortage exists or large and heavy patterns must be moved.

Lighting: Whether to include windows in a pattern storage or not is optional with the person planning the building. If windows are included they should be of wire reinforced glass. However, windows become dirty rather quickly. Overhead shelves and storage further absorb daylight. In the end only a small percentage of available daylight from windows filters through to light up the inside of the building. Consequently, it is seldom that natural light is sufficient. Artificial light, especially of the fluorescent type, well distributed and supplemented by the use of extension cord outlets placed in convenient locations and at suitable distances, is much more satisfactory. In many instances daylight from windows is supplemented by artificial lighting as just described.

Ventilation: If the pattern vault is built as here recommended, temperature changes will be slight. Ventilation may be provided by revolving ventilators of the draft type. However, both window and draft type ventilation may be supplanted by air conditioning units that rectify temperature and humidity variations. Much depends on the type of pattern stored. Small variations due to atmospheric changes that would be found on large patterns would hardly affect their use. The same variations found on small patterns used for work of a precise nature might scrap the pattern.

Fire Protection: Mention has been made of the fire hazards of a pattern storage building. Yet in spite of the fire possibilities few fires are actually recorded. How are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these fires kept to a minimum? Fireproof construction is the chief reason and already has been discussed. The placing of numerous fire extinguishers at strategic points throughout the vault and their regular checking is a sound investment. If the fire can be checked at its source it is beaten. Many large corporations have plant fire brigades that hold regular drills periodically. They are effective in fire fighting. Automatic sprinkler systems with sprinkler heads over the pattern shelving and aisles are a popular means of fire fighting. The ADT has a system of wires strung in a similar manner to that of the automatic sprinkler system for alarm spreading. The alarm is sent quickly to interested parties who are charged with fire protection. This includes the local fire department.

Because the pattern vault is visited by few persons other than those in charge of pattern storage, and also possibly because of the shortage of help, slovenly housekeeping may develop. Consequently, it behooves management to check periodically the condition of the vault. In fairness to the pattern clerks in charge of vaults visited by the author and others with which he is familiar, it should be said that the large percentage of pattern storage facilities are kept in good order. Sometimes space is at a premium and other departments move in or storage space is taken. It is then that slovenly habits develop.

Pattern Insurance: Much concern has been expressed in the matter of fire insurance on pattern equipment. Interested parties include pattern jobbers, owners and those using patterns in casting production. Coverage may be had to suit varying conditions (*Please turn to page* 210)

Fig. 6—Illustrating the use of runways which eliminate two-story construction and the use of ladders in handling patterns on upper shelves

Fig. 7—Bulk piling of large patterns lends itself well to mezzanine floor type of storage. The ladder, which can be swung up out of the way, also is used as a slide for lowering patterns and coreboxers to the floor or onto a truck

Fig. 8—These heavy wire mesh shelves may be raised or lowered by means of the adjustable brackets equipped with set screws. Mesh offers several advantages over solid material for pattern shelves

Fig. 9—Conventional type of wood shelf storage partitioned off so uniformly that it may be classed as bin storage

A Program for FOUNDRY

By FRED W. HURT
Training Supervisor
Lynchburg Foundry Co.
Lynchburg, Va.

Above — Frank Crist, coreroom foreman of Lynchburg Foundry Co., leading the discussion at work group meeting

Right—Plant visitation group from the general office is given the fundamentals of patternmaking by Harry Layne, pattern shop foreman

Far right — Responsible for planning the training program are: John J. De Hart Jr., apprentice training instructor; Fred W. Hurt, training supervisor, and Gordon Moore Jr., personnel assistant

TRAINING

The need for training and developing men for the foundry industry probably was never greater than it is today, the author points out in describing the comprehensive training program developed at the Lynchburg Foundry Co.

IN the course of a talk made at an AFA meeting in Chicago last year, Max Kuniansky, our vice president and general manager, said: "The foundation of an industry rests upon men and its future depends upon its capacity to develop men." Recognition of the soundness of this idea is the basic reason for the organization of a comprehensive training program in the Lynchburg Foundry Co. While it has always been true that the success of any company depends on the character and ability of the people who make up that organization, there has probably never been a time when the need for training and developing men was greater than now. The dislocation of people, industrial progress and expansion, and the present day tempo of change, call for methods of training which will meet the challenge of a new industrial order.

In common with most casting manufacturers, our plants and processes underwent many changes during the war period. With the coming of peace there was a second conversion to urgently needed peacetime products, many of which were entirely new to our foundries. We came to midyear of 1945 with 80 per cent more people than were employed in 1940. Many departments had undergone complete changes in mechanical equipment as well as types of product. As a result of these conditions, perhaps not more than half of our people could be considered as sufficiently trained to do their jobs with only normal supervision a new type program was urgently needed.

Many good features of a training program had been in effect before the war but due to all-out efforts for war production and the necessity for supervisory personnel to remain almost constantly on the job, many of these features had been discontinued or greatly curtailed. Regulations on travel and group meetings made it necessary to discontinue meetings of supervisory personnel which had been held at a city midway between the location of our two plants. An apprentice training program which had supplied our needs for the more highly skilled trades was reduced to 10 per cent of its prewar enrollment since these young men were of the age group and physical condition most needed for the armed forces.

With these facts facing company management, it was evident that a revival and revamping of training activities were in order. M. E. McWane, president, laid down certain broad principles for the conduct of the program. He stated that each individual in the company has his part to play in the fulfillment of company policies and in the accomplishment of company plans, and that unless there is an unobstructed flow of information properly conditioned to the needs of each level of responsibility, the result would

Rush K. Gearhart (right), grinding room foreman, and Samuel H. Allen, assistant foreman, examine casting

be misunderstandings and misinterpretations with lack of concerted efforts toward the desired goals.

The responsibility for organizing and co-ordinating the training program was delegated to C. W. McLennan, personnel director. Training was to be done entirely as a staff function, with the training staff to be ready at all times to adapt training to any current need. Another requirement was that progress and accomplishments were to be measured to determine if training is functioning in terms of the objectives.

The chain of activities now set up to provide for free exchange of information and ideas is headed by executive group meetings which are conducted by the company president. These bimonthly meetings are the fountain head of information on policy and long term planning. In addition to giving the chief executive the opportunity to present views of overall plans, these meetings afford each executive an opportunity to better determine his obligation in the fulfillment of the plans and to outline the steps he shall take to give action through correct interpretation and instructions to those under his supervision.

Decisions reached in these meetings which affect personnel practices are incorporated into the subject matter of regularly scheduled personnel policy conferences. These meetings are conducted by the personnel director and are attended by all levels of supervisory personnel; they cover such subjects as legislation, wage structure, incentive plan, job evaluation, employee benefit plans and any similar matters of current interest. The same subjects are scheduled for three successive days in order that plant foremen may attend at the time most convenient to them. This plan also serves to keep the groups small which encourages individual participation in the discussion.

Our belief is that one of the first needs of the foreman in these days of constant change is to be kept well informed. No matter what his ability as a leader may be, he must be kept well posted in order that personnel duties may be performed with intelligence and uniformity. It is worth while for him to be familiar with even such matters as the company's group insurance plans, so that he will be able to answer everyday questions of his men, rather than resorting to the easier way of referring them to someone outside of the department.

Heading up training activities in the technical phases of the work are the technical group meetings conducted by Mr. Kuniansky. Nationally known authorities are secured as speakers on such subjects as metallurgy, sand control, cupola practices, gating and risering and kindred subjects. Those whose duties in our company are related to the subject to be discussed attend these meetings and are offered the privilege of talking over their work with the speaker, either during the course of the meeting or when the speaker visits our plants. The discussion in these technical meetings and those of a similar nature conducted by our own personnel, keep us informed on most recent developments and point the way to improvement in our practices. Such improvements are explained thoroughly to those having the responsibility for their performance, are incorporated into training procedures and become standard practice.

Meetings of plant foremen and staff personnel are held regularly by works managers to consider production planning, safety, scheduling, costs, and other plant matters. These meetings also serve as a means of passing along information and decisions which have grown out of the previously mentioned meetings. (*Please turn to page* 158)

Below—Scene at a personnel policy conference being conducted by C. W. McLennan, personnel director

Above—Henry D. McGraw being instructed in a molding operation by Archie Wooldridge, instructing supervisor

Right—The right way to make a core is being shown Whittie T. Wood, coremaker, by Milton Fry, job instructor

Below—Apprentice training group. A four-year course of individual instruction, including classroom work and practical shop experience, helps to supply the company's need for personnel in the more highly skilled crafts

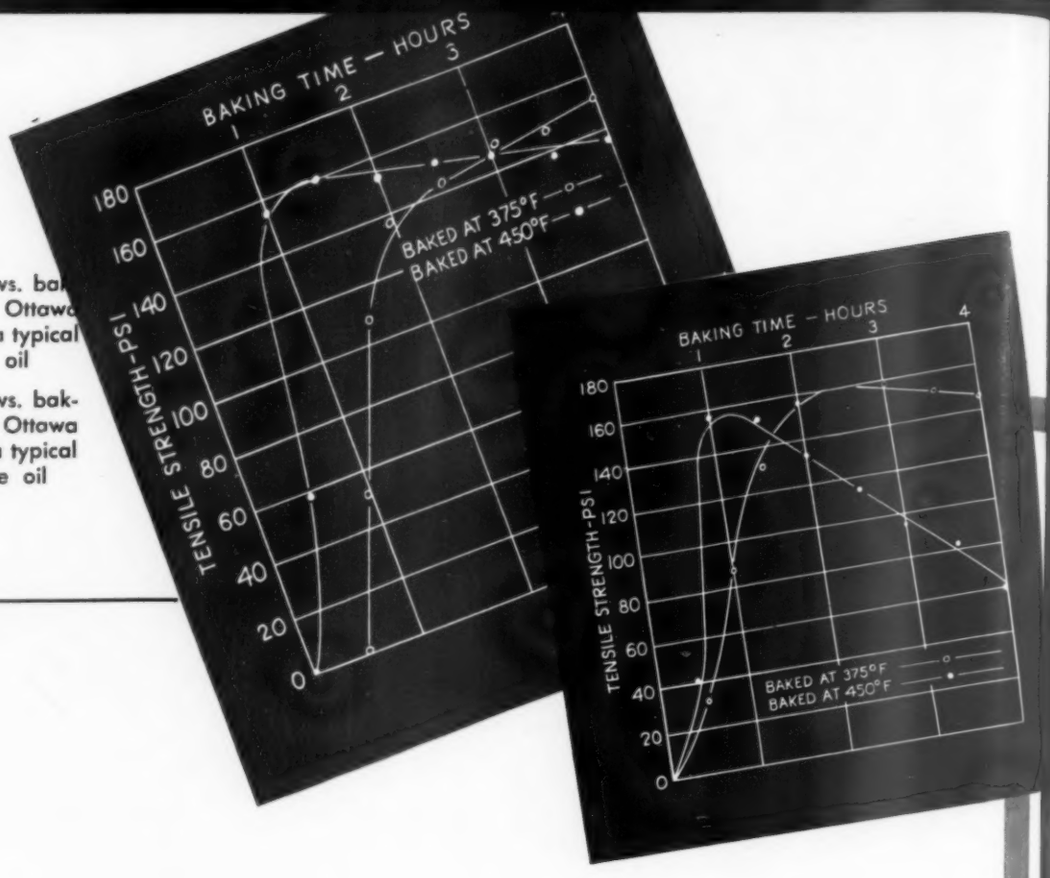


Fig. 1—Tensile strength vs. baking time curves of an Ottawa type sand bonded with a typical conventional core oil

Fig. 2—Tensile strength vs. baking time curves of an Ottawa type sand bonded with a typical low temperature core oil

ACHIEVEMENTS of the magnesium industry during World War II have been widely publicized, and are accepted as important contributions to this country's war time technological advances. This is particularly true of the foundry branch of the industry which produced millions of pounds of aircraft and engine castings to rigid specifications.

When one realizes that the majority of our wartime magnesium foundries were not even conversant with light metals prior to 1939, this record becomes quite outstanding. Complete co-operation by those with the necessary know-how, and diligent research and development by not only the foundries, but also by foundry suppliers, are the basic reasons for the success of this relatively young industry during the war.

Among the numerous magnesium foundry developments made during the past five years, those involving changes in core sand practice received less attention than the more spectacular advances made in melting practice, heat treatment, etc. However, core sand developments cannot be slighted, for they contribute immeasurably to the overall success of foundry operations.

Although these changes were introduced during the high production war era, their full values will be realized in peacetime operations. Each of the innovations to be discussed tends to lower the cost per casting by decreasing the time, labor or scrap on any one job. In order to evaluate the importance of these developments, a brief discussion of American prewar methods in the use of core binders and inhibitors follows.

Five years ago, core oils of the type that require baking temperatures of 425—450 F were used almost exclusively, for baked core strength. It is interesting to note that the same general types of core oils were used in ferrous and nonferrous foundry practice and were merely adapted to magnesium coreroom use. Numerous disadvantages are manifested with the use of this class of binders in magnesium practice.

To prevent "burning" of casting surfaces, cores were treated by the following general methods, as outlined by Brooks and Winston.[1]

1. Baked cores were sprayed with an aqueous solution of fluorides.
2. Approximately 2.5 per cent of a mixture of sulphur and boric acid was added to the core sand mix.

The second method was limited to use with small cores and castings, for at baking temperatures of 450 F, practically all the sulphur was volatilized. Residual sulphur at the surface of cores was invariably less than 0.04 per cent, an amount too small to be effective in combating oxidation of relatively heavy casting sections. When such sections were encountered, it was usual practice to use both protective methods in conjuction with one another.

The disadvantages which accompanied the fluoride spraying operations were manifold. Since intricately designed cores could not be sprayed uniformly, casting scrap, due either to "burning" (cores inadaquately sprayed) or to "cold shuts" (cores over-sprayed) was not uncommon. After a baked core was sprayed, it was returned to an oven at a time and temperature compatible with the volatilization of all moisture and a minimum of fluorides. In addition to consuming time, labor and potential core oven capacity, spraying also produced relatively friable core surfaces which ultimately increased casting cleaning costs.

The advent of high production schedules effectively brought out the limitations of conventional core oils and available types of inhibitors.

Chamberlain and Peters[2] have shown that when casting magnesium sections up to ½-in., the major part of adjacent cores do not attain a temperature of 500 F. With the use of existing core oils, core knockout often presented a major problem to the high production foundry. Due to

TABLE I—Water Solubility Data of Ammonium and Potassium Fluoborates

Chemical	Solubility g/100g Solution at 77 F	Solubility g/100g Solution at 212 F	pH of 1% Solution
Ammonium Fluoborate	20.3	46.5	3.4
Potassium Fluoborate	0.55	8.5	*3.1

* Saturated solution.

TABLE II—Thermal Characteristics of Ammonium and Potassium Fluoborates

Salt	Melting Point	Condition at Melting Point	% Decomposition/Hr 725 F	995 F	1247 F
Ammonium Fluoborate	446 F	Sublimation starts and continues as heat is applied.	....	....	....
Potassium Fluoborate	987 F	Essentially stable.	0.006	0.630	10.97

TABLE III—Per Cent Loss of Ammonium Fluoborate at 350° and 450° F

(Data is expressed as % loss in weight of 10-g sample)

Time-Hours	350 F	450 F
½	.11%	1.30%
1	.24	2.48
1½	.33	4.00
2	.49	4.48
4	.79	8.41

MAGNESIUM FOUNDRY *Core Practice*

By GEORGE W. KURACHEK

Foundry Metallurgist
Wright Aeronautical Corp.
Paterson, N. J.

the high retained strength of these cores, many unusual methods were devised for the removal of internal cores from castings of light sections. These special techniques either increased casting scrap, or necessitated the use of excessive time, labor and equipment. As an illustration, some foundries used the practice of soaking castings in hot water to loosen cores, and then followed up with a water-sand blast to remove all core sand. With the use of this system, castings and risers were subsequently oven dried. Although internal cores were readily removed, this method was based primarily on the use of extensive equipment and labor.

The hot shortness of magnesium alloys of the 6 per cent Al, 3 per cent Zn type contributed to the problem of eliminating hot tears caused by the use of noncollapsible cores.

Urea Formaldehyde Resin Core Binders—During the war years a significant development in magnesium core sand practice was the introduction of synthetic urea formaldehyde resins as core binders The urea formaldehyde type resins should not be confused with the class of resins available to the foundry industry prior to 1940. Pragoff[3], in his excellent work, outlined in detail the properties of natural resins when used as core binders. The principal type of resin referred to by Pragoff is a derivative of pine tree rosins. This material is thermoplastic which, by definition, softens and flows upon the application of heat. Although resins of this class find many applications in ferrous foundry practice, they are unsuitable as binders for magnesium cores. Therefore, any subsequent reference to resins specifically alludes to the synthetic urea formaldehyde type only.

The adhesive properties of synthetic urea formaldehyde resins have been known since about 1920. These resins are widely used in both the textile and plywood fields as waterproof binders.

The application of synthetic resins as core binders completely altered coreshop practices in numerous foundries during the war period. Cores made with this type of binder possess unusual properties which are particularly adapted for use with the low-heat-content magnesium alloys. The difficulties many foundries experienced in core knockout was almost completely alleviated by the use of resin bonded cores. This factor is attributed to the comparatively low retained strengths of such cores.

Synthetic urea formaldehyde resins are thermosetting. Upon the application of heat, the resin cures by the process of condensation to a hard, infusible, insoluble material. Excessive heating causes the resin to break down and lose its bonding properties. This change is accompanied by the evolution of gases.

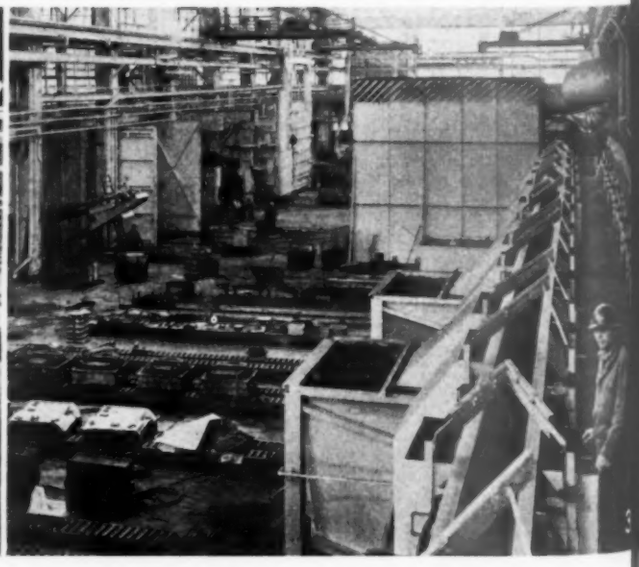
In general magnesium core shop practice, approximately 0.5-0.8 per cent resin, in either the dehydrated state or in solution with water, is added to core sand mixes. Water is added to a sand mix in sufficient quantity to impart suitable workability properties to the sand. Resin bonded cores generally are baked at (*Please turn to page* 162)

Fig. 1—Main bay of steel and iron foundry showing cranes at three levels, electric furnaces at left, mechanical unit at right beyond center. Light enters from glass side walls and roof

Fig. 2—Conveyor carries cores from the benches to an upright gas-fired oven

Fig. 3—Sand hoppers above the machines in the mechanical unit are filled from a belt

Fig. 4—The nonferrous foundry is equipped with roller conveyor lines



This is the first of two articles describing the foundry modernization program completed during the war at the Norfolk Navy Shipyard, Portsmouth, Va. The concluding article will appear next month

YARD Revamps Foundry

By PAT DWYER
Engineering Editor
THE FOUNDRY

ACTIVITIES in the various navy yards maintained by the United States on the East or West coast naturally fluctuate with the great waves of changing economic conditions in alternate periods of peace and war. Nowhere is this better illustrated than in the Norfolk Navy Yard in which the name was changed to Norfolk Naval Shipyard, Dec. 1, 1945. The yard is located in Portsmouth, Va., separated from Norfolk by a branch of the Elizabeth river, and the change in name is another slight gesture designed to prevent any person who might be interested from confusing this yard with another U. S. Navy Yard at Portsmouth, N. H. General knowledge is not improved to any marked extent when one learns that the Portsmouth yard is on an island in the Piscataqua river included in the township of Kittery, Me. In this district the river with the quaint Indian name serves as a boundary line between Maine and New Hampshire.

The Norfolk yard is older than the Navy and has been operated under five different flags—British, Virginia Colonial, State of Virginia, Confederate States and the United States. Exact founding date is unkown, but it was first used by the English in 1752 as a careening ground for their ships and was known as the Gosport Marine Yard. At the outbreak of the Revolutionary War the Colony of Virginia confiscated the yard. In 1799 it was recaptured by the British, who abandoned it a month later after burning every building, every vessel finished or in process of construction and all supplies, including a great quantity of beautiful oak timber. In 1801 the United States purchased the 16-acre property for $12,000. The reservation has grown to 746.88 acres. As of June, 1945, the value of the plant had increased to nearly $136,000,000. Today, the yard is recognized as one of the most up-to-date naval repair, ship building and manufacturing plants in the United States. Facilities are ample for building, docking or repairing anything afloat, from the small invasion craft to the most modern battleships and carriers.

New docks and shop facilities were provided during World War I. Still greater expansion marked the years immediately preceding and during World War II. Total water front was increased to 4¼ miles and the total number of berths increased to 66. Although primarily a repair station, the yard has built some of the finest ships in the fleet, including the

comparatively recent ALABAMA, SHANGRI-LA, LAKE CHAMPLAIN, TARAWA, and numerous smaller ships. During the period from Pearl Harbor to V-J Day the yard was awarded the Army-Navy "E" for excellence six consecutive times. The sixth award carried the privilege of flying the "E" pennant with five stars.

Expansion program during World War I included the erection and equipment of a foundry for making a wide range of castings in iron, steel and nonferrous metals. To meet the vastly increased demand during World War II a modernization program, including the installation of a great amount of new equipment, was inaugurated and carried through to completion. The feverish activity is over, when the employees, divided into three shifts, worked the clock around 7 days per week, but the statistical record, nowhere more elaborate than in the Navy, indicates that the program has been satisfactory from every standpoint—reduction in manual labor, decreased cost of operation, and removal of smoke and dust from the atmosphere.

At present, the Norfolk Naval Shipyard foundry is recognized as the most modern establishment of the kind conducted by what the average citizen vaguely refers to as the "Gov'mint." A general description of the foundry will be followed by a detail reference to some of the more prominent methods, materials and equipment. Major additions to existing equipment include hoods for all furnaces, mechanical handling of mold and core sand, installation of two new cupolas with mechanical charging accessories, shakeout stations, a washery where castings are cleaned by a stream of water at high pressure, and substitution of ten tilting, crucible type furnaces for a former battery of pit type furnaces in the nonferrous department of the foundry.

Walls of the foundry building, 180 x 552 ft, are practically all glass and steel to provide a maximum of natural light. The roof is exceptionally high to provide clearance for the two upper cranes in the main bay. Cranes in this bay operate at three levels. Six 5-ton floor-controlled wall cranes operate on the lowest level. Two 15 and one 10-ton cranes operate on the second level above the wall cranes. The runway for these cranes extends into the flask yard 150 ft at the south end of the building. One 40-ton and one 80-ton crane operate on the highest track and, if necessary, carry loads over the wall cranes and over the cranes in the middle level. The high cranes are equipped with auxiliary hoists, 10 and 20 tons, respectively.

Two 10-ton cranes with a span of 100 ft operate on a runway 600 ft in length over a stockyard on the west side of the building. Under former conditions these cranes, equipped with grab bucket or magnet, depending on material, unloaded incoming raw materials, including sand, coke, pig iron and scrap. They still unload the pig iron and scrap, but the coke and sand are discharged from drop bottom hopper cars into concrete bins. An elevator in the sand pit lifts the sand and discharges onto a moving belt, which conducts it to any one of eight bins. From the storage bins the sand is taken to any one of four muller type mixers where it is prepared for various specific purposes either as facing sand for the molds, or as mixtures to be converted into cores for iron, brass, steel or aluminum castings. In one section of the foundry, where small castings are made on a production basis, a long, overhead belt conveys the sand from the mixer to the hoppers which serve the molding machines.

Preparation and distribution of sand always has been a problem in a shop where long production runs of duplicate castings are the exception, and where most of the work falls into the general jobbing class. In the main bay of the foundry, facing sand is distributed by wheelbarrow and tote box. A locomotive type sandslinger mounted on a track in the center of the main bay, is provided with a detachable sand hopper. While this hopper is in use, a second hopper in the general vicinity is filled with sand. Exchange readily is made by one of the cranes when the sand in the first hopper is exhausted.

Many of the larger molds are made on two jolt, roll-over, pattern draw machines. The largest molds are made in pits in the floor. Green sand molds are employed extensively, but many molds for iron or steel are dried. Steel is melted in a battery of four electric furnaces with rated capacity of ¼, ½, 3 and 12 tons. According to the practically universal steel foundry custom, the heat

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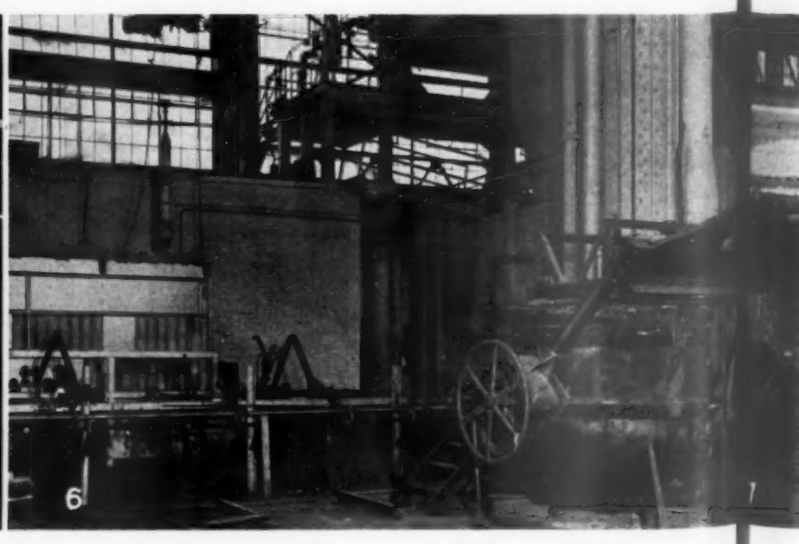
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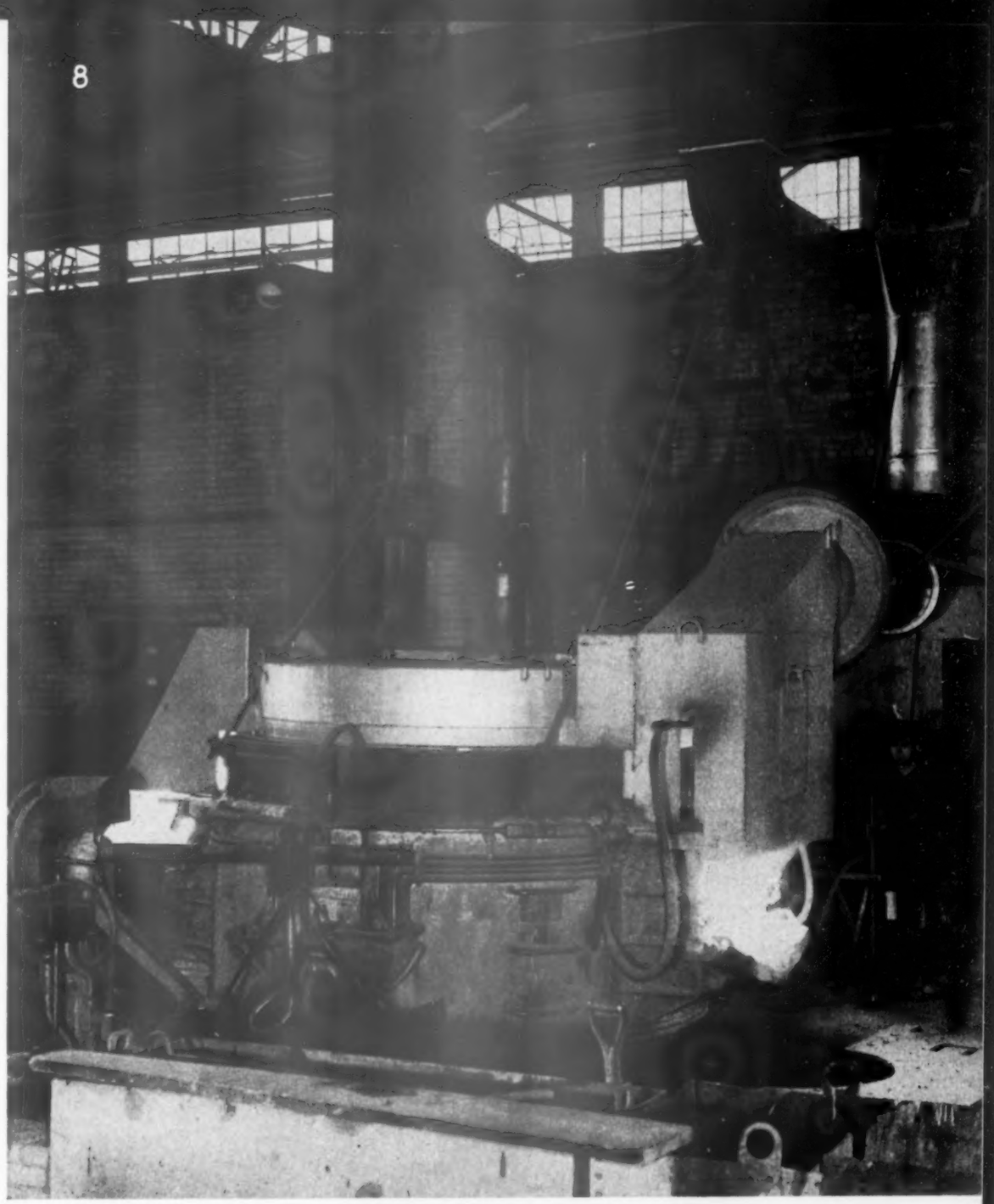


Fig. 5—Ladle linings are raised to a red heat before they are filled with metal

Fig. 6—Special gas burners introduced through a cover heat the linings in crane ladles

Fig. 7—Cores from the ovens are assembled in various combinations before they are delivered to the molding floors

Fig. 8—While the electric furnace is in operation all the smoke and gas is exhausted through a portable hood and suitable piping

Fig. 9—Metal in the nonferrous foundry is distributed in ladles or crucibles suspended from a monorail

Fig. 10—Small ladle linings are heated by gas flames erupting from table top openings

Fig. 11—Chipping benches are served by conveyors and separated by protective wire screens

usually exceeds the rated capacity. Two new cupolas, 42 in. inside diameter, are available for melting the gray iron. In an emergency the two cupolas might be operated at the same time, but that is a rather remote contingency. Under ordinary conditions the cupolas will be used on alternate days. Metal is tapped into a 3000-lb mixing ladle in front of each cupola. Special alloy gray iron heats are prepared in one of the electric furnaces.

Medium and large size cores are made on a section of the main floor and dried in an oven 8 x 8 x 16 ft. All others are made on a gallery above the nonferrous foundry, 58 x 312 ft, partly on benches by hand, but mostly on a battery of molding machines. These cores are dried in three large electric rack type ovens and in a propane-gas-fired tower type oven. Cores from the rack type ovens are picked up by lift truck and taken by elevator to the ground floor, where they are distributed as required to the various molding stations. At the end of the up and down cycle, cores from the tower oven are removed at the main floor level and taken either to storage, directly to the molds, or to assembly stations where they are joined in various combinations before they are placed in the molds. Green cores move on five roller conveyors between machines and tower oven.

Cores Used Inside and Outside

In certain instances the entire mold is made and baked as a core and then set up for pouring without benefit of the usual flask. In proper nomenclature the term core refers to a body of green or dried sand which forms an opening or chamber inside a casting. With the easy and careless assurance which prevails among foundrymen, the term core is applied to any shaped body of sand dried in an oven, irrespective of whether it is destined to form the inside or the outside of a casting. Fortunately the item is of little or no importance, since foundrymen know instinctively what is meant, and confusion exists only in the minds of roving reporters with an obsession for dubbing all foundrymen, ferrous and nonferrous, stalwart and brawny steel puddlers.

As an added precaution in the production of castings clean on the outside and clean and solid on the inside, many molds are skin dried with a torch. Where this amount of drying is not considered sufficient, the molds are completely dried in two propane-gas-fired ovens, one 15 x 26 ft, the other 14½ x 29½ ft. Larger molds are dried with portable gas fired units. Standards of acceptance by the Navy are unusually high for castings and, for that matter, all manner of supplies purchased on the outside. If possible, inspection is even more strict and standards of acceptance are higher on castings produced under direct Navy supervision. The Navy is a fighting organization. Every casting has a definite place and is expected to render definite service. Therefore, it has to be perfect within the usual meaning of the term.

A highly informative and interesting paper of the work involved in developing a method for producing certain large steel castings, under the title "Application of Controlled Directional Solidification to Large Steel Castings," was presented at the 1940 con- (*Please turn to page* 182)

QUONSET HUTS house foundry

All foundry operations except melting and cleaning are conducted in this structure. Cupola is located outside the building just back of the wall in the left background, while cleaning is accomplished in another smaller Quonset hut behind and a short distance from the one shown. (Photo by *Buffalo Evening News*)

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

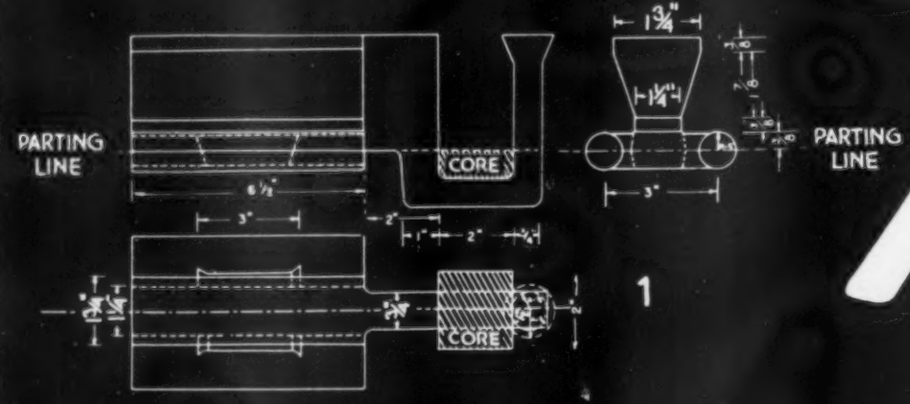
EARLY this year, after being away from the industry and engaged in other business pursuits for five years, E. M. Benedict decided to return to the foundry field, and formed the E. M. Benedict Co. Inc., Lancaster, N. Y. to produce light and medium gray iron castings. After an unsuccessful search for a suitable building in which to conduct foundry operations, the organization decided to build a modern structure. But further investigation indicated that due to the scarcity of building materials and building craftsmen the most optimistic forecast was a delay of 6 to 8 months before construction could be started.

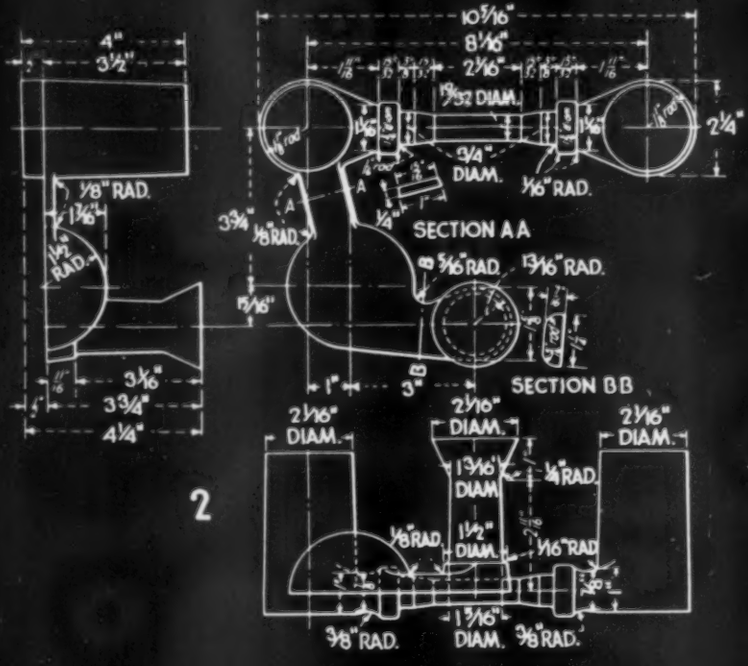
Since the firm was anxious to begin operations as soon as possible, various possibilities were reviewed. During that study the thought occurred that the Quonset hut, so widely used by the military forces, might solve the building problem. It was found that the materials for construction were readily available, and erection was a matter of days rather than months. So the company purchased two huts as a nucleus. Site selected for location of the foundry was in open country near the outskirts of Lancaster abutting the main line of the Delaware, Lackawanna & Western railroad.

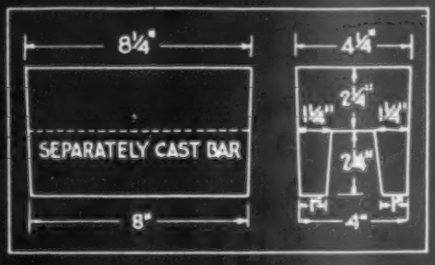
Work on the construction of the first Quonset hut, 40 x 100 ft. was begun the latter part of March and finished in the middle of April. This consisted of leveling the site, laying a heavy concrete base or floor and erecting the structure itself which only took 5 days. A short time later the second hut 40 x 60 ft. was erected about 70 ft. behind and in line with the first hut. Eventually the space between the two will be covered with the same type of construction, except where the cupola is located. First heat was poured May 31.

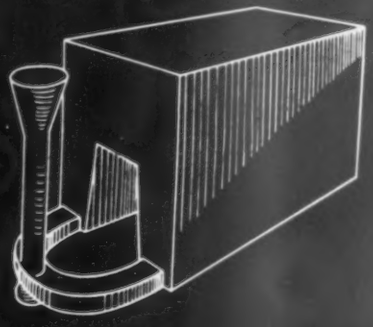
As indicated in the accompanying illustration the foundry proper is located in the larger of the two huts while cleaning operations are conducted in the other. Cupola is located in the open just outside the concrete-block backwall, in the left background of the illustration, with the fan-type blower inside the wall. (*Please turn to page* 208)

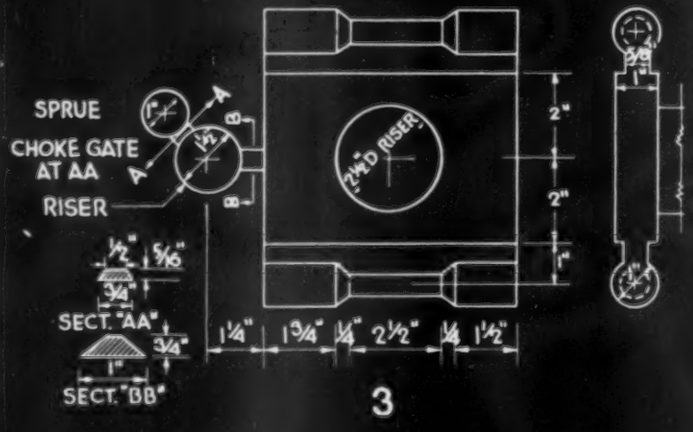
Test

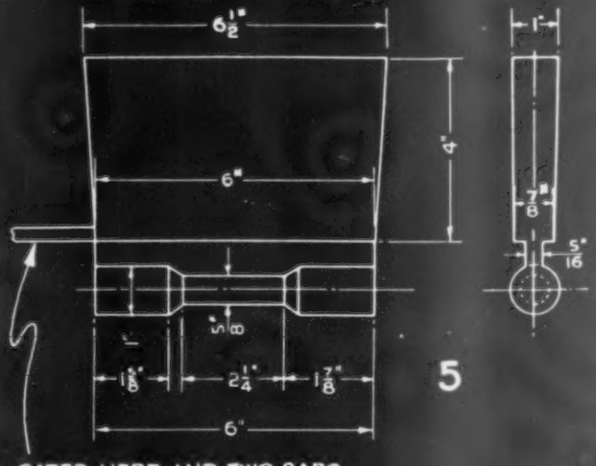












GATED HERE AND TWO BARS PER MOLD POURED FROM COMMON RUNNER

Bars FOR 85-5-5-5 ALLOY

This is the first of two installments comprising the 1946 Foundation Lecture presented before the 50th Anniversary Convention of the American Foundrymen's Association

By G. H. CLAMER
President
Ajax Metal Co., Philadelphia
Chairman
Metallurgists' Advisory Committee,
Non-Ferrous Ingot Metal Institute

FOREWORD: *The invitation to present the 1946 Foundation Lecture of AFA before the association's 50th Anniversary Convention was accepted with the understanding that the writer would act as spokesman for submission of a report on a research project now being conducted at Battelle Memorial Institute, Columbus, O., under sponsorship of the Non-Ferrous Ingot Metal Institute. At the time this invitation was accepted, it was the intent that the research project would cover the study of gases and oxides in copper-base alloys for sand castings, and general supervision of the project was delegated by the institute to its Metallurgists' Advisory Committee, of which the writer is chairman.*

It was realized at the start that it was essential, before this project could be intelligently undertaken, that a standard test-bar design and standardized practice for making it would have to be developed and adopted. Many sporadic studies had previously been made and much had been published on the subject, but there was no record that the problem had previously been attacked in a comprehensive, scientific manner.

The Metallurgists' Advisory Committee thereupon decided to make such an investigation the first step of the Battelle project. This first step, as it developed, proved to be of greater magnitude than originally contemplated. Two years have been devoted to this initial phase of the project, notwithstanding the fact that it was narrowed down to the study of test-bar design and test-bar practice for a single alloy, namely: 85 copper, 5 tin, 5 lead, 5 zinc. It is, therefore, only on this preliminary stage of the project that I am now able to report. Other phases of the contemplated project will be reported on in the future.

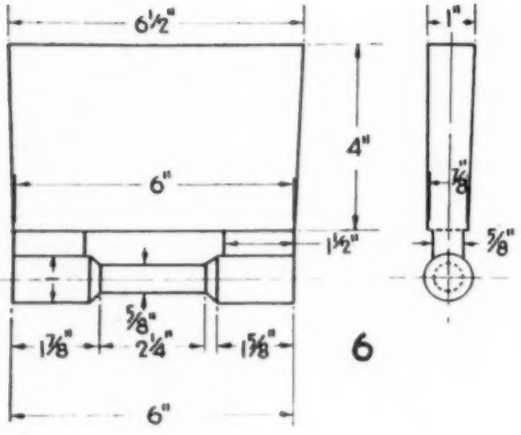
TEST bars are important. Hundreds of thousands of them are cast each year, and both the foundry and the purchaser of castings rely upon them for quality control. The primary purposes of this investigation are: First, to conduct a fundamental study of various factors which affect test bars. Second, to establish limitations of test bars. Third, to point the way to establish better test-bar practices whereby the test bar will be of greater value to the metal producer, foundry, and casting purchaser. Fourth, to establish the effect of various melting practices on melt quality as measured by test-bar properties.

The primary purpose of test bars is as a measure of the melt quality in the pot. Since they measure only one of several factors which affect casting quality, they cannot be a measure of the soundness, properties, or serviceability of the castings poured from the same melt.

Since it is a function of test bar properties to reflect melt quality, the term "melt quality" first must be defined. While the concept of the melt quality is more fully defined in the complete report of the investigation, it will be sufficient to point out here that melt quality and melt composition are synonymous. It is axiomatic that the first requisite of a melt of high quality is that it be of correct composition. The chemical laboratory and the spectrograph are adequate tools to determine this aspect of melt quality, and no further reference need be made to it. The aspect of melt quality or melt composition with which we are concerned is the content of gases and gas formers. Both laboratory and commercial operations have shown that, as the content of the gases or gas formers in the melt increases, a certain type of unsoundness, termed microporosity, increases with consequent decrease in mechanical properties. This is an important fact and will bear repetition.

As the content of gases and gas formers in the melt increases, all other factors the same, there will be an increase in microporosity in the castings poured from the melt, which in turn will cause a decrease in tensile properties. It is this fact alone which makes it possible to have a correlation between properties of a test bar or any other casting on the one hand and the melt quality on the other. This defect, microporosity, has been referred to by foundrymen and in the technical press by such terms as "shrinkage," "incipient shrinkage," "porosity," "gas porosity," "microvoids," "microtears," "microshrink-

Fig. 1—Universal test bar with an improved gate riser increased in height for a 3-in. cope. Fig. 2—LTB-1 bar was modified without changing dimensions of the gate to form two cavities per mold. Risers were reduced to 3 in. to permit use of a 3-in. cope. Fig. 3—Horizontal ⅝-in. web Webbert test bar. Fig. 4—Keel block-test bar with two coupons. May be gated at bottom or top of coupon and normally is used for alloys subject to shrinkage defects. Fig. 5—Navy 5/16-in. web Webbert bar. This design was modified to form the Navy ⅝-in. web Webbert by increasing web thickness to ⅝-in.



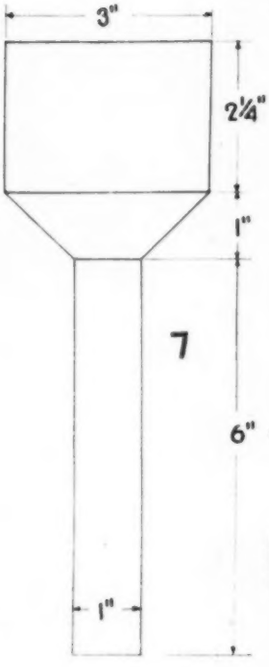
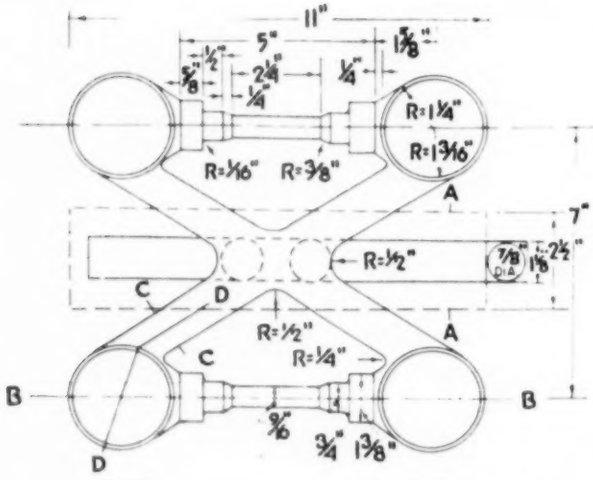


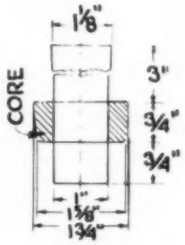
Fig. 6—Navy ⅝-in. web Crown bar (Fig. 10A of Federal Specification QQ-M-15A)

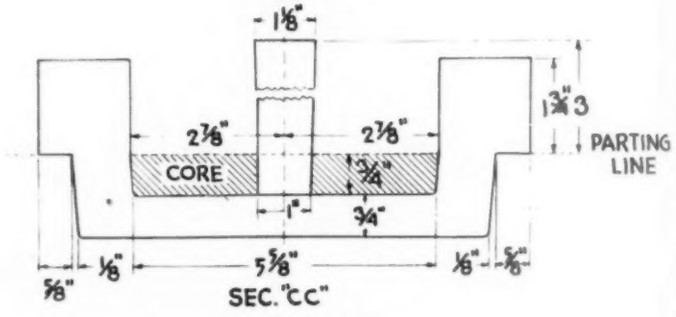
Fig. 7—DDT test bar as standardized for light alloys in Britain

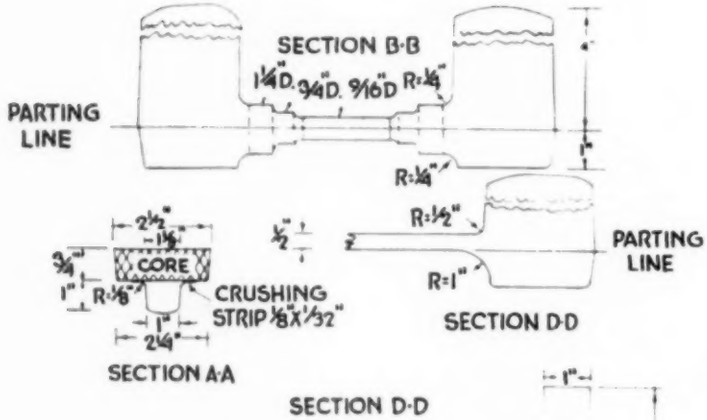
Fig. 8—The two-bar design

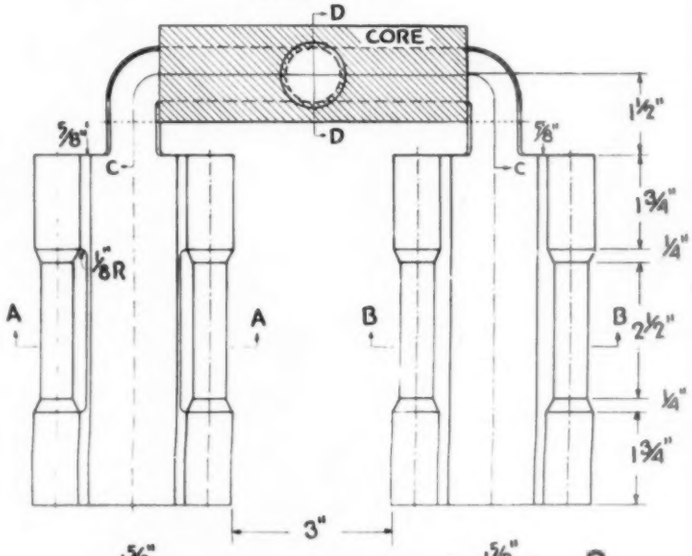
Fig. 9—Modified ⅝-in. web Webbert and Crown test bars

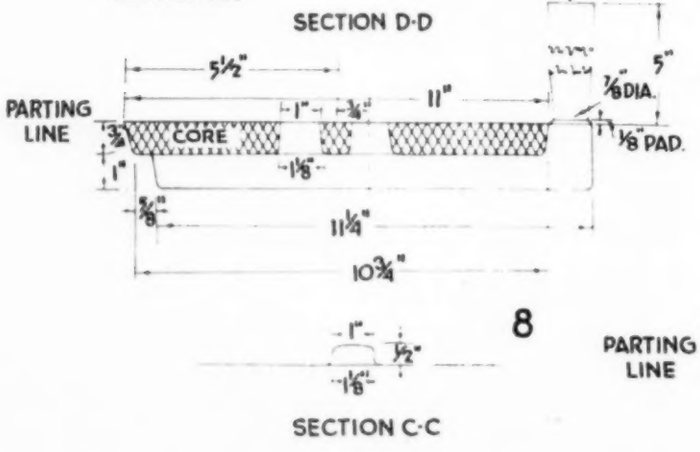


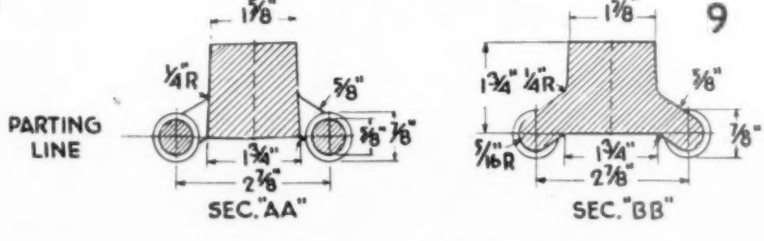












age," "sponginess," "unsoundness," etc. An example of this defect which we will call microporosity, is illustrated by the dark areas in Fig. 10. This illustration is a micrograph of the entire cross section of an unsound Webbert-type test bar having poor properties. However, it should be noted that in cast-to-shape, test-bar designs, the rapid directional solidification does not produce microporosity. Instead, high gas contents produce very small, rounded pinholes, the effect of which is somewhat similar to microporosity.

Having defined the term "melt quality" and how the melt quality is related to the soundness and the tensile properties of test bars, there is one more concept which must be firmly established. Experience in the laboratory and in commercial operations has shown that the occurrence of this defect, microporosity, which is so closely related to melt quality, is also dependent upon many other foundry variables such as pouring temperature, pouring technique, gating practice, design, and possibly many other factors more difficult to control. This is not only true of test bars but of all castings alike. Therefore, the second important concept is that, if the tensile properties of the test bars are to reflect melt quality, the test-bar practice must be standardized so that the only varying factor will be melt quality. Then, this factor largely will determine only the amount of microporosity in the test bars and the tensile properties obtained.

Briefly stated: The lower the melt quality, the higher the content of gases and gas formers, the greater the amount of the defect known as microporosity, which in turn produces lower tensile properties, provided all other factors in our test-bar practice are maintained as constant as possible.

Two Types of Gas Evolution

Presence of gases or gas formers in the melt are harmful only if they are evolved when the melt solidifies. In general, there are two types of gas evolution. The first type results from decreased solubility of the gas in the melt when the latter solidifies. While there are several gases which conceivably might be a cause of trouble, hydrogen is probably the only gas which might be evolved during solidification as a result of decreased solubility.

The second type involves the reaction of the gas or gas former in solution in the melt with oxygen, or an oxide also in solution in the melt. This reaction forms an insoluble gaseous compound which produces voids in the castings. Again, there are several possibilities but the following are the two most likely reactions.

1. $2H + O$ or an oxide $\rightleftarrows H_2O$
2. $C + O$ or an oxide $\rightleftarrows CO$

In this type, the dissolved gas, hydrogen, or the gas former, carbon, are in solution in the melt and may be in equilibrium with oxygen or oxide also dissolved in the melt. When the melt solidifies, the reacting oxide or oxygen and gas or gas former increases in the remaining liquid in the melt. Hence, as the equilibrium is destroyed, the reaction proceeds to the right, forming steam or H_2O by one reaction or carbon monoxide by the other.

The quantity of gases or gas formers, namely, 0.0000022 per cent H or 0.0000173 per cent C required to produce 1 per cent voids in a solidifying casting is very low indeed. This is illustrated by the data in Table I. It is obvious that the content of the gases and gas formers required to form substantial unsoundness in a solidifying casting is very much lower than the best known present-day means of gas analysis.

The source of the hydrogen would most likely be from moisture, a main product of combustion of gaseous, liquid, or solid fuels. Hydrogen may also be absorbed from moisture in the atmosphere or that adsorbed on the metal charge, furnace equipment, etc.

If carbon is a source of unsoundness, its most obvious source would be contact with clay-graphite crucibles and furnace linings, or carbonaceous furnace gases.

In type two gas evolution the presence of oxygen or an oxide dissolved in the melt is also a prerequisite. Oxygen from moisture or in the air are the logical sources.

When we refer to melt quality then, we are actually referring to the content of hydrogen and oxygen, and possibly carbon, in the melt in the pot. Since the quantity of these gases or gas formers is very low, ordinary chemical analysis cannot readily be made, but the tensile properties of test bars becomes a fairly reliable means of measuring this gas content, provided we employ a test bar of suitable design and utilize a standardized test-bar practice. Some test-bar designs may reflect melt quality more readily than others, and as a result, the investigation of the effect of test-bar design has been given considerable attention.

Eleven different designs of test bars were investigated as follows:

1. The universal test bar, illustrated in Fig. 1, which, excepting for the gate, was suggested by the English investigator, W. A. Baker. This is actually a crown-type bar with a heavy test section.

2. The well-known L.T.B. bar is illustrated in Fig. 2. This is a cast-to-shape bar with a 0.575-in. test section. The initial test-bar values obtained on this design were somewhat lower than were anticipated. The pattern originally was made up to form blind risers, but it was found that open risers gave very substantially higher tensile and yield strength values, and very much higher elongation values. Accordingly, 3-in. open risers were used in place of the 3¼ in. blind risers.

3. The horizontal ⅝-in. web Webbert test bar is shown by Fig. 3. Attempts were made to modify this bar by

TABLE I—Amount of Gas or Gas Former Required To Precipitate by Type 1 Gas Evolution or React in Type 2 Gas Evolution To Produce 1 Per Cent Voids at 1900 F in a Solidifying Copper-Base Alloy Having Density of 8.6 g per cc at 1900 F

Gas or Gas Former	CC per 100 G*	Per Cent by Weight
TYPE 1 GAS EVOLUTION		
H_2	0 0242	0.0000022
TYPE 2 GAS EVOLUTION**		
[2H+O (or an oxide)$\rightleftarrows$H O] (A)	0.0242	0.0000022
[C+O (or an oxide)$\rightleftarrows$CO] (B)	.....	0.0000130

*Measured at 32 F and existing atmospheric pressure.
**Also 0.0121 cc of O_2 or 0.0000173 per cent O by weight is required for Reactions (A) and (B) to form a precipitated gas causing 1 per cent voids.
***It is assumed that the gas in the voids is at atmospheric pressure. Actually the pressure might be slightly more, in which case proportionately more gas would be required to produce 1 per cent voids than the quantities listed.

Fig. 10—Polished cross section at fracture of horizontal ⅝-in. web Webbert test bar of 85-5-5-5 alloy poured at 2250 F from poor quality metal. Tensile strength was 34,400 psi and elongation 29.3 per cent. Fracture was fine gray at exterior with large open coppery area in center enclosed by white line and extending to the ⅝-in. web

Fig. 11—Polished section taken through plane of web of horizontal ⅝-in. web Webbert test bar of 85-5-5-5 alloy poured at 2240 F from melt of high quality. Density in shoulder was 8.59. Fracture was fine gray at exterior with small area of open coppery appearance extending to point of attachment with web. Tensile strength was 35,800 psi and elongation 42.1 per cent. Porosity, although considerable, is fairly fine and not characterized by marked angularity

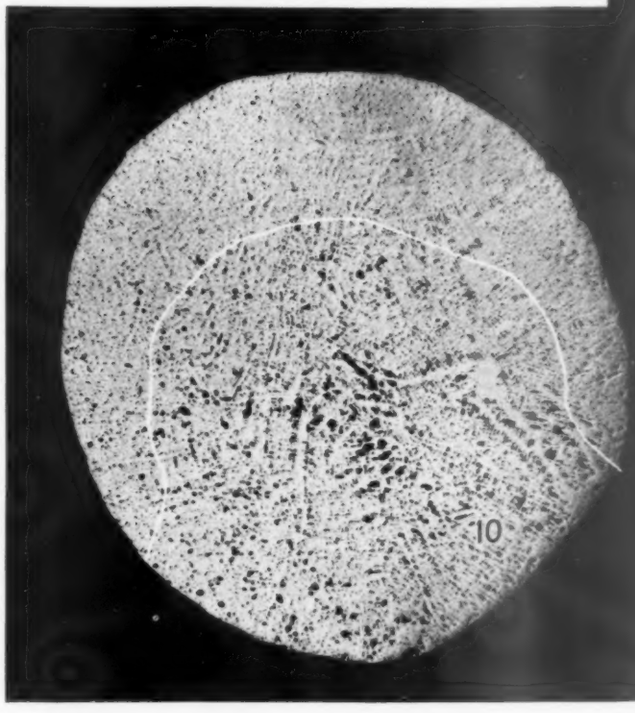
Fig. 12—Polished longitudinal section near fracture of LTB-1 test bar of 85-5-5-5 alloy poured at 2250 F from high quality melt. Density in shoulder was 8.84; tensile strength 36,600 psi and elongation 45.9 per cent. Bar had columnar radial grains extending from exterior to interior, and fracture was fine gray with this columnar radial structure apparent. Large dark areas are tears produced when bar was fractured

Fig. 13A—Microradiograph of horizontal ⅝-in. web Webbert bar poured from high quality melt at 2150 F into natural green sand mold. Tensile strength was 37,000 psi and elongation 48 per cent. Maximum porosity occurs in portion adjacent to connecting web

Fig. 13B—Photomicrograph at X50 of same specimen as in preceding figure

Fig. 14A—Test bar section entirely comparable to that of Fig. 13A except that melt was poured into synthetic sand mold which had adverse effect on structure and test-bar properties obtained

Fig. 14B—Photomicrograph at X50 of same specimen as in preceding figure, in plane of web midway between periphery and center of specimen. Compared with Fig. 13B this bar is slightly sounder, but lead particles are much more angular and tensile properties lower



removing the center riser and placing two end risers across the plate between the grip ends of the opposite test bars, and by converting it from a Webbert-type to a crown-type design. These modifications either damaged the properties or left them unchanged. Consequently, the original design shown by this illustration was used.

4. The standard keel-block casting with two coupons is shown by Fig. 4. Properties obtained were low, and it was concluded that this test bar was unsuited for 85-5-5-5 alloy. Accordingly, this design was soon abandoned.

5. The two-bar casting is shown by Fig. 8. This is quite similar to the L.T.B. excepting that the risers are heavier and the gate somewhat different. The properties obtained were so similar to those from the L.T.B. that it was abandoned.

6 and 7. The well known standard bar, Fig. 10 of Federal Specification QQ-M-15A is shown by Fig. 5. This design was used with a 5/16-in. web as shown, and also with a ⅝-in. web.

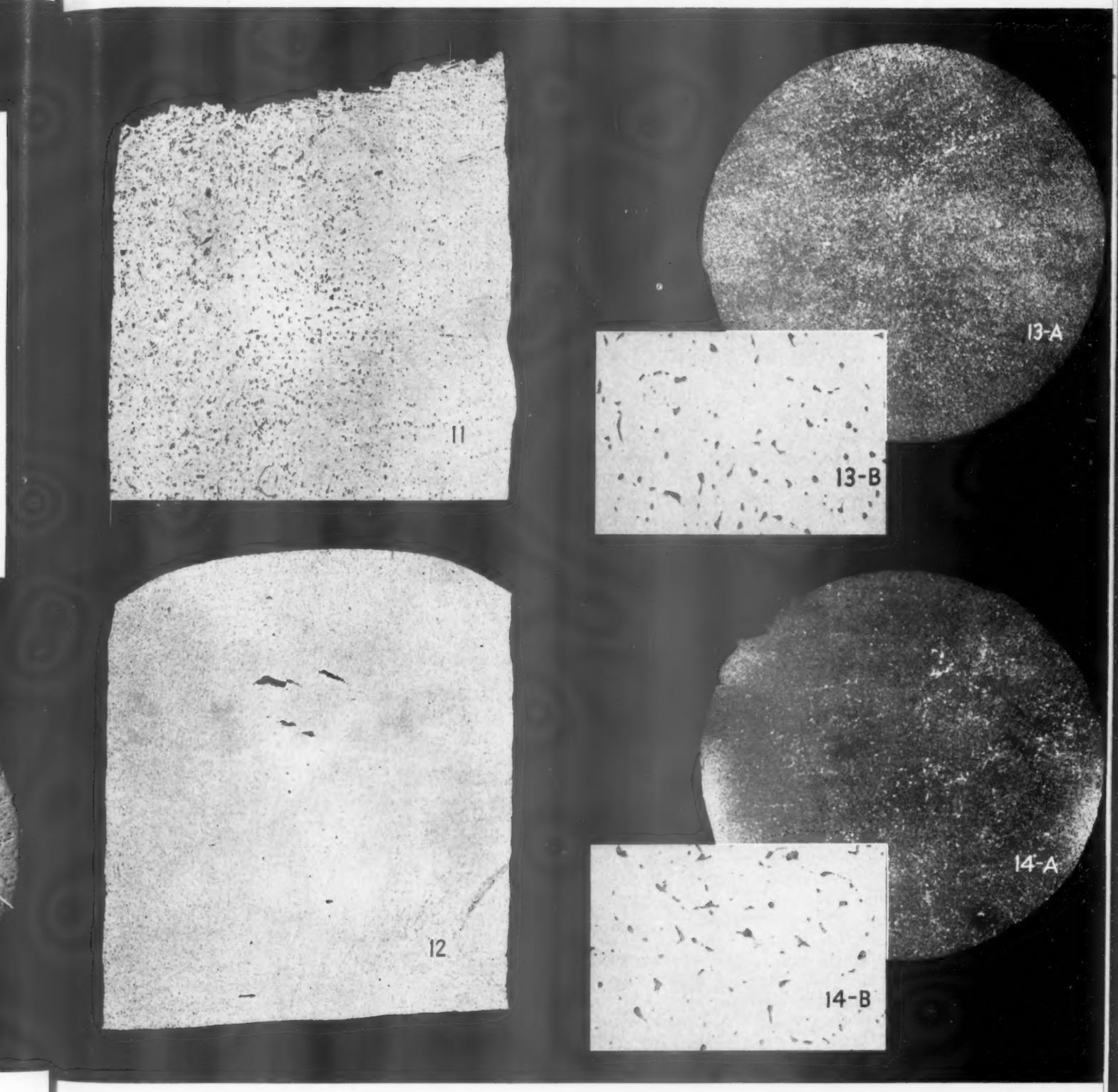
8. The well known Federal Crown-type bar, represented by Fig. 10A of Specification QQ-M-15A, is shown by Fig. 6.

9. The British standard D.D.T. test bar recommended for some nonferrous metals in Britain is shown by Fig. 7. The tensile properties were very low, though higher than those reported by the British, so it was concluded that factors other than melt quality were predominant in determining the test-bar properties.

10 and 11. Fig. 9 shows the modified web Webbert and the modified Crown bars of which two bars each were cast in the same mold cavity. Both designs have ⅝-in. webs.

As previously indicated, three of these 11 designs were discarded after preliminary tests. Eight of the 11 designs were investigated in detail to determine their relative merits.

The horizontal ⅝-in. web Webbert test bar, representative of Webbert-type bars, and the L.T.B. representative of cast-to-shape bars, were used to correlate fracture, microstructure, tensile properties, and effects of pouring temperature. The fracture and microstructure of these two types of bars are somewhat different.



As illustrated by Fig. 10, the Webbert-type bars invariably contain an area near the center and extending to the point of attachment with the web where the fracture is open and coppery. This occurs as a result of fracture through the microporosity. Accordingly, the extent and degree of microporosity in the test bar can be judged from the appearance of this coppery open area on the fracture. The balance of the fracture has a fine grayish appearance and grades off into the open coppery area in the center. The dark areas enclosed by the white line correspond to the open fracture.

Fig. 10 shows a typical example of severe microporosity in the entire cross section of a Webbert-type test bar poured from a melt of poor quality. All other factors the same, the amount of this microporosity increases with increasing gas content of the melt. Furthermore, for a given melt, the amount and extent of microporosity increases with increasing pour- (*Please turn to page* 125)

The Stability of Iron Carbide

By LESTER CROME
Director of Research
Dayton Malleable Iron Co.
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IT IS generally agreed that the carbide Fe_3C in iron-carbon alloys is metastable below the solidus, or at least through most of this range, although there is still some question as to the thermodynamic stability of the pure compound[1], according to Epstein, *Alloys of Iron and Carbon*, Vol. I, page 116. This article is concerned not so much with the thermodynamic view as with the actual direction in which the reaction moves in commercial iron-carbon alloys.

With carbide previously formed, conditions may be such that its persistence is great enough to conceal its metastable nature. However, if carbide forms under conditions which are apparently the same as those under which it normally decomposes, it then would appear that some other factor has entered, resulting in a stable carbide—stable from a practical standpoint if not from that of thermodynamics.

The fact that some elements greatly decrease the stability or persistence of the carbide and that others increase it either as Fe_3C or by combination to form complex carbides of greater stability is the basis for control of the reaction. Incidentally, it should be mentioned that in this respect, if other conditions vary, the various elements are not always consistent in their behavior. Under one set of conditions a given element may have a pronounced graphitizing influence while under another set of conditions much less, none at all or even behave as a stabilizer. This is true of such commonly used materials as silicon and graphite.

Aside from the action of other added elements or compounds, except those present in the atmosphere and their possible reaction products, there is evidence that under certain conditions the carbide is stable. This "stable" carbide may not necessarily be Fe_3C, although it reacts similarly to all etchants so far applied.

In the manufacture of malleable cast iron the composition is adjusted so that no graphitization will occur as the casting in the mold cools through the graphitizing range, thus producing an all-carbide structure. In the subsequent malleablizing operation these carbides are decomposed completely. The reaction $Fe_3C \rightleftharpoons 3\ Fe + C$ moved completely to the right producing malleable cast iron as a result of the unstable nature of iron carbide under these particular conditions. The structure has changed from one of all carbide to one of no carbide. It consists of carbon nodules dispersed in a matrix of ferrite grains. At this point everything is normal. The reaction proceeded as expected.

However, if a specimen be subjected to this malleablizing treatment a sufficient number of times, carbide will again be present, either as pearlite or massive carbide or both. An interesting point in this connection is that some of the carbide, whether as pearlite or in massive form, is present adjacent to and actually in contact with the free carbon, indicating that the carbon particles have not only lost their normally strong graphitizing power, but also may possibly be exerting a stabilizing influence.

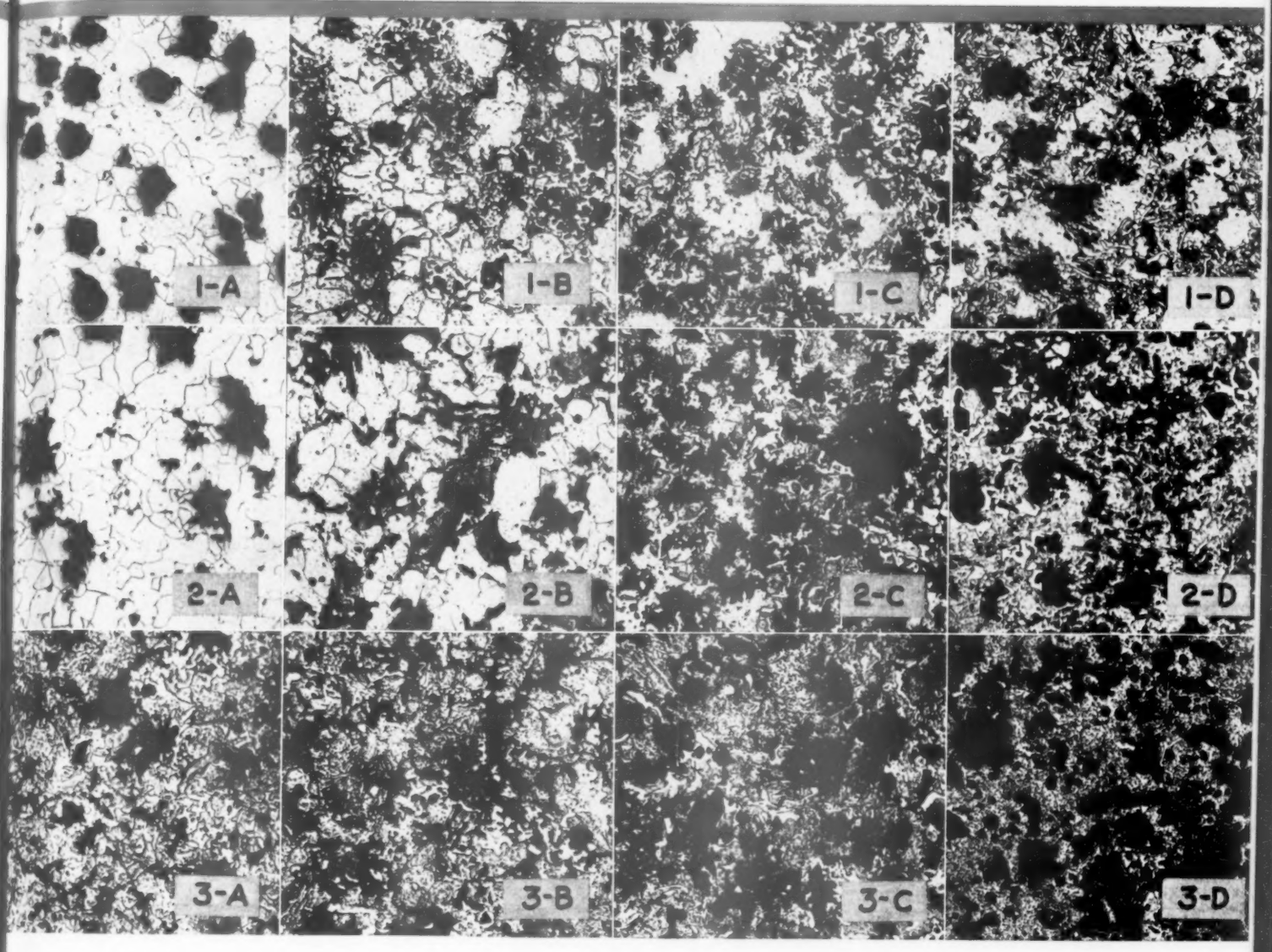
Of many specimens from numerous heats, both air furnace melted and cupola-air furnace duplexed and using strongly carburizing to strongly decarburizing atmospheres in the malleablizing operation, (*Please turn to page* 128)

Fig. 1—Specimens processed in strongly decarburizing atmosphere. *A*—1 cycle; *B*—6 cycles; C—11 cycles; *D*—17 cycles. All magnifications 100X. *A, B* etched with nital, *C, D* with ammonium persulphate

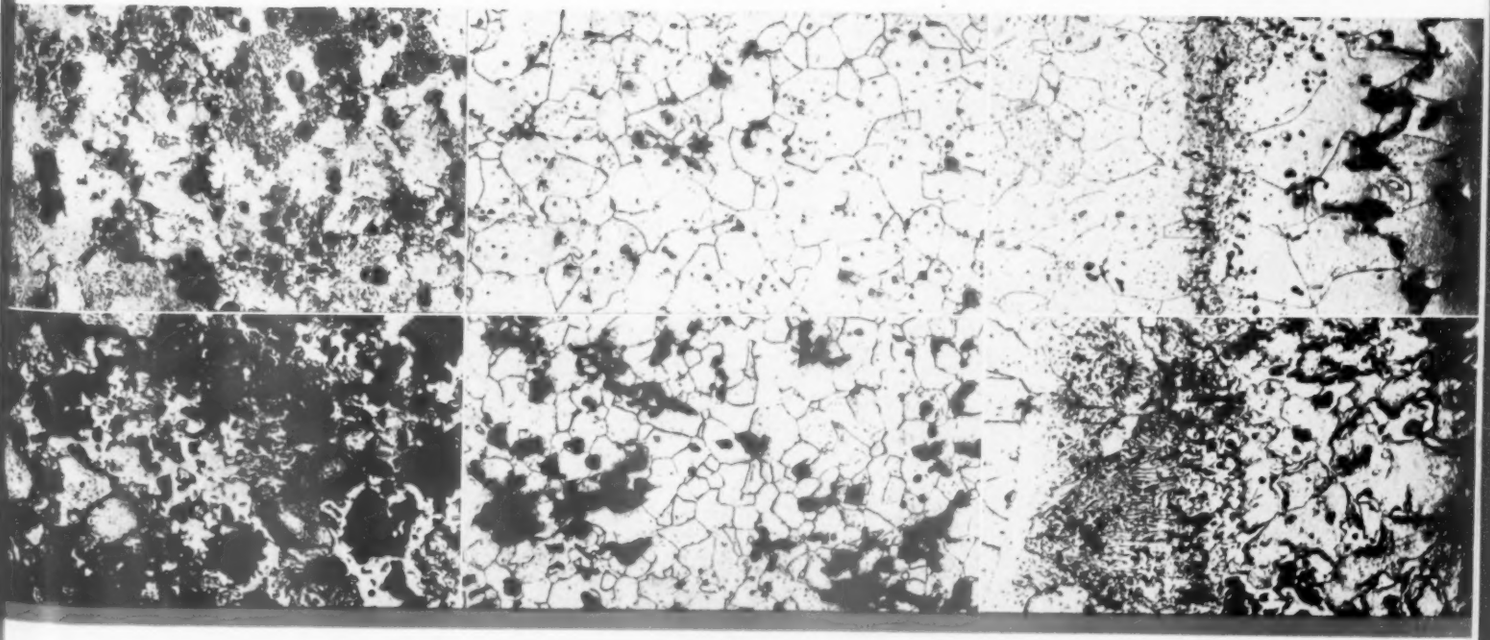
Fig. 2—Specimens processed in commercial carburizing compound. *A*—1 cycle; *B*—6 cycles; C—8 cycles; *D*—30 cycles. All magnifications 100X. *A, B, C* etched with nital, *D* with copper chloride

Fig. 3—Specimens processed 15 times in carburizing compound followed by indicated number of cycles enclosed in small pipes. *A*—1 cycle; *B*—5 cycles; C—7 cycles; *D*—9 cycles. All magnifications 100X. *A, B, C* etched with nital, *D* with copper chloride

Fig. 4—Top row specimens processed eight times in strongly decarburizing atmosphere. Bottom specimens processed eight times in strongly decarburizing atmosphere followed by four times in carburizing compound. All magnifications 100X. To photograph center specimen in bottom row, copper chloride etch was used. All others etched with nital



CENTER INTERMEDIATE SURFACE



Classification and prevention of defectives and inspection methods are described in this second of two articles covering casting defects

ELIMINATION OF Casting

IN CONSIDERING the various aspects of defective work it is desirable, in the first instance, to clarify the matter by fundamental definitions and classifications of types of scrap, as well as to consider methods for prevention.

Defective work means *all* work that falls below the standards of material and workmanship set by the customer. Under certain conditions it may even include work accepted by the customer, in some cases under protest.

Also included under defective work are defective molds not poured, cores broken or otherwise unsuitable for use, and metal pigged as unsuitable for the work intended. Defective castings which subsequently are saved by welding, burning, plugging, filling or other means of salvage, must also be included in the same category and play a major part in final accumulation of scrap costs.

Defective castings may be classified as follow:

1. Foundry defectives—defects discovered before leaving the foundry.
2. Returned defectives—defects revealed on machining or test, or overlooked by foundry inspection.
3. Re-machined defectives—defects compensated for or repaired by purchaser at additional machining costs, these costs backcharged to foundry.

Foundry defectives normally constitute the largest percentage of total defectives when considered purely on a tonnage basis.

Returned defectives usually represent considerably less tonnage than foundry defectives, but when added to figures included in the first group, often reach serious proportions and involve replacement on an emergency basis, whereby firm schedules are disrupted, and consequently maximum efficiency is rendered impossible.

Re-machined defectives, or castings salvaged by the

Fig. 6—Crankshaft for 6-cyl engine. This Meehanite casting is 8 ft long

Fig. 7—Crankshaft shown in preceding figure sawed through all webs, fillets, pins, journals and flange

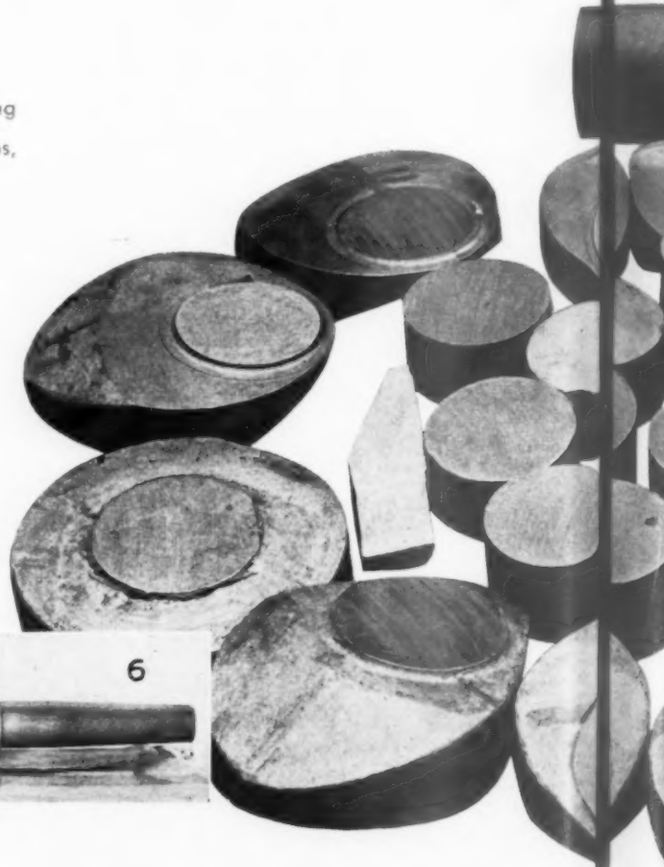
Fig. 8—Poor melting and molding are evidenced by the purged riser illustrated

Fig. 9—The same riser cross sectioned, showing oxidation of metal

Fig. 10—Shot iron revealed at the hub of a flywheel as a result of poor gating

Fig. 11—First machine cut on a cylinder head uncovered gas pockets as shown. Trouble was traced to insertion of hot cores

(Photos courtesy Cooper-Bessemer Corp., Grove City, Pa.)



By GEORGE JOHNSTONE JR.
President and General Manager
Lawrence Foundry Co.
Grove City, Pa.

Defects

customer, in many cases involve back-charges to the foundry which are little less than complete replacement costs. In most foundries, such costs are grudgingly credited, and little or no effort is made by management to keep all personnel constantly aware of the seriousness of these charges. The net result of this laxity is indifference by foremen and production workers to any defects other than those actually seen.

All defects normally can be grouped in seven distinct classes:

1. Defects due to metal.
2. Defects due to molding.
3. Defects due to cores.
4. Defects due to pouring.
5. Defects due to cleaning.
6. Defects due to pattern equipment.
7. Defects due to design.

Space does not permit detailed investigation of all aspects of these classifications. However, several glaring examples of common defects, resulting from one or a combination of the classifications previously mentioned, will be described.

Fig. 8 shows a purged riser, the inevitable result of poor melting or poor molding. Such risers are an indication that metal has been oxidized in the melting process, or that boiling has occurred within the mold during the pouring process due to wet sand or other reasons. The same riser cut cross-sectionally, as shown in Fig. 9, proves conclusively that in this case the metal was definitely oxidized. Examination of the casting to which this riser was attached showed the same condition throughout.

By systematic yet simple investigation of this defect, no doubts were left in the minds of the investigators, and the accumulated evidence clearly pointed to the source—oxidized metal. This investigation required one-half hour by two men—the castings inspector and melting foreman. Before another heat was melted, it was definitely proved that the first portion of a new car of very thin and very rusty scrap had been used the preceding day, and mixes for the next heat were changed to exclude this material. As a result, the oxidized condition was completely eliminated and the faulty specimens photographed and filed in the laboratory for future reference.

Hot Cores Cause Defects

Fig. 11 illustrates gas pockets uncovered after removal of the first machine cut, from the cope surface of a compressor cylinder head. Three similar castings poured from the same heat revealed defects in the same location which were identical in nature to the first. A complete set of cores were sectioned to determine whether or not venting standards were being maintained, and to further determine the degree of dryness of all cores. This investigation revealed no deviation from established standards, and charts from mold ovens were checked. These showed that the regular drying cycle had taken place, and that all molds had been thoroughly dried.

Continued investigation finally disclosed that the six sets of cores had been joined and finished immediately following removal from the core oven. While still very hot these cores were assembled in the cold dry molds. Molds were closed and a period of approximately six hours elapsed before pouring. During this time, steam thrown off by the hot cores had condensed on the flat cope surfaces of the mold, and as a result localized boiling was inevitable. This case was a decided breach of established standards, and served to impress the core-finishing foreman and dry floor foreman with the importance of assembling cores in molds only where temperatures of both had reached uniform coolness.

Fig. 10 clearly illustrates the formation of shot-iron in the hub section of a flywheel. This casting had been scrapped as a result of large scabs on the rough surface of the bore, and the shot-iron exposed after breaking for remelt. This illustration clearly shows the menace to normal operating life expectancy of castings containing such hidden defects. Unquestionably, the tensile strength, ductility, and fatigue strength of this casting would be vastly reduced through the defective section. Had the casting been salvaged after slip-shod or irresponsible inspection, it is probable that complete machining would have failed to uncover these inner defects. The final use of this casting very probably would have involved failure in operation and a black eye to the foundry.

This wheel had been poured through a ring of small pencil gates, separated at regular distances around the entire hub. Investigation of the gates and their location on the casting showed that most of them had been carelessly placed, were in most cases flush with the hub core wall, and in others rammed off, so that metal impinged from a decided angle against the core wall. This caused considerable turbulence in the bottom of the mold when the first metal dropped, and resulted in formation of shot-iron. After a sufficient volume of metal had formed a basin for the gates, this shot-iron was lifted as the mold

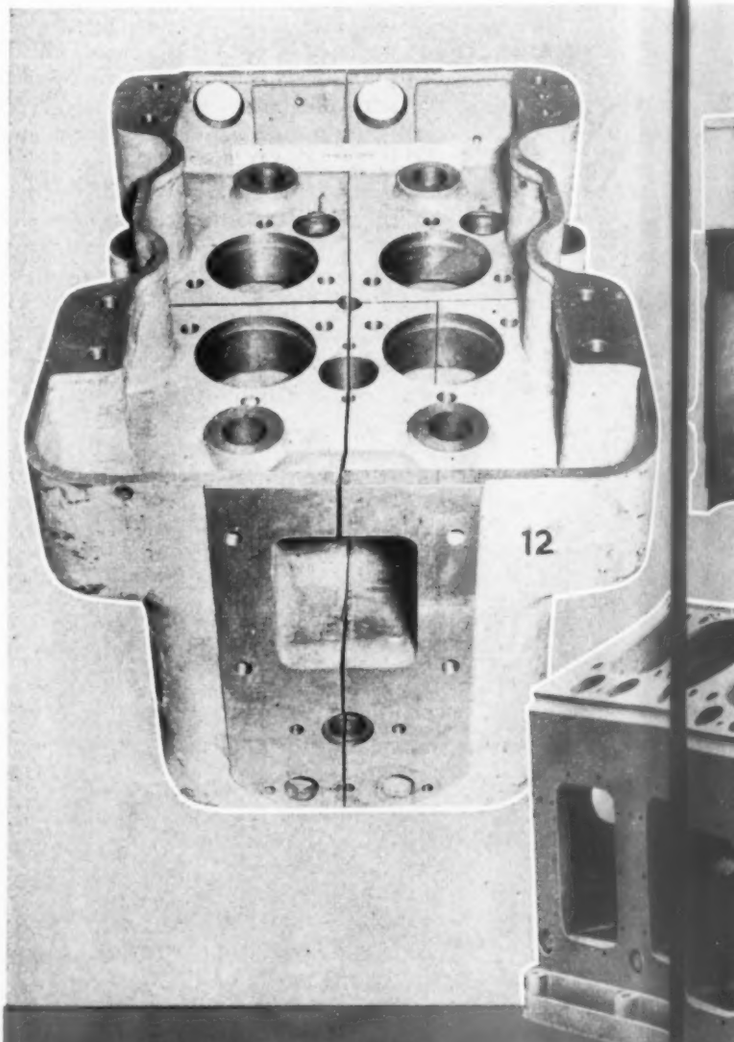


Fig. 12—Completely machined diesel engine cylinder head sectioned for inspection

Fig. 13—A section of the casting shown in Fig. 12

Fig. 14—Section of a difficult and intricate diesel engine casting

Fig. 15—Main frame for 6-cyl diesel engine. Minimum section 3/16-in., maximum ½-in.

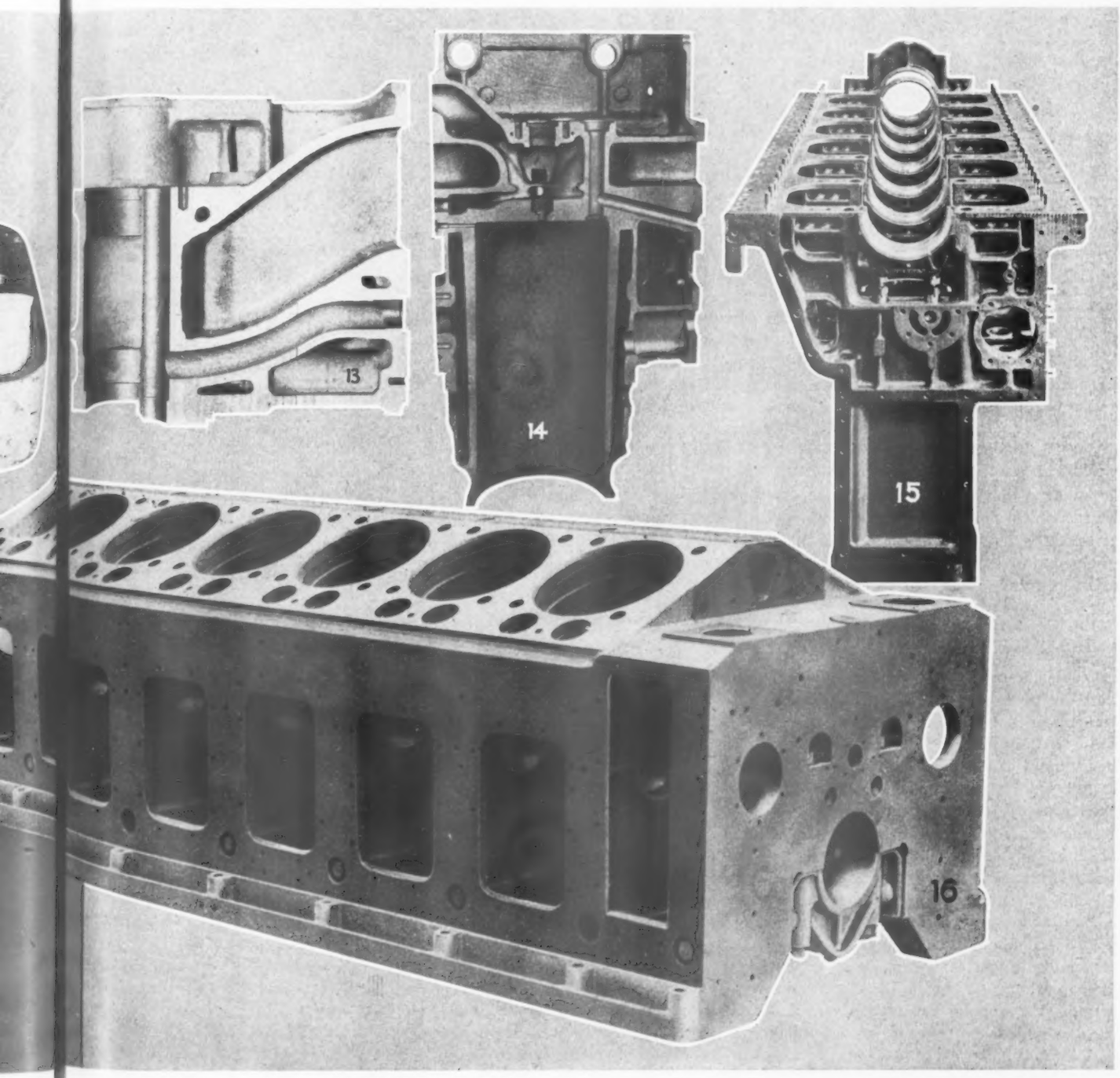
Fig. 16—Main frame of 16-cyl diesel engine. Finished weight 4900 lb

filled, and finally trapped as shown near the cope surface.

Prevention of scabs, buckles and shot-formation where pencil gates are used, lies in judicious relation of gate diameter to casting section through which metal is poured, central location of gates, and straight ramming of gates in cope. . In addition, these precautions will be of no avail, unless the mold is poured in a perfectly level position, and the runner-box is properly designed.

These few examples of relatively common foundry defects, serve to prove the extreme necessity for diligent and unceasing campaigns in all foundries to reduce defectives and scrap. Establishment of definite standards for all phases of casting production, and the vigilant maintenance of these standards by all workers through alert supervision, offer the only sure means of combating the problem. Again it should be emphasized that high volume, low cost production of quality castings is possible only where the entire organization is actively aware of direct and intangible losses accrued from defectives.

Inspection of Castings—Some foundries have good inspection, others have poor inspection, and a number, sad to relate, have none other than the last laborer to handle castings at the cleaning room doors. The value of a thorough system of casting inspection in the control of defective work cannot be too strongly emphasized. Such a system serves two main purposes: 1. To prevent defective castings from leaving the foundry. 2. To supply complete details of all defectives (*Please turn to page* 210)



What the foundry industry should do if it expects to attract young engineers to its ranks is detailed in this discussion presented originally before the annual meeting of the Gray Iron Founders Society

RECRUITING and TRAINING foundry engineers

FROM many authoritative sources, we are told that industry faces a serious shortage of professional engineers in the years immediately ahead. The war has interrupted the training and preparation of men for the engineering profession to such an extent that those who are best able to appraise the situation express genuine alarm. This opinion comes from employment authorities in industry, from government analysts of the distribution of professional services, and from the spokesmen of professional organizations.

It does little good now to debate whether different wartime policies with reference to manpower could have prevented the present shortage. We must look ahead and view the obligations and opportunities which confront us.

A factor favorable to our making up the lag is the impact which the war has made upon the thinking of America as to the place of science and technology in the world today.

Before the war, the phrase "age of technology" had come into common usage. The technical developments made during and after World War I, the startling results of scientific discovery and invention in the 20's and 30's, and the miraculous results of new industrial processes combined to create a popular appreciation of the importance of science and technology in modern society.

Training Must Keep Step with Technological Progress

World War II has even more dramatically focused our attention on science and its applications. Even before the revelation of the atomic bomb, the opinion of those best qualified to speak judged that we had made, in the period of the war, scientific, technological, and engineering progress that would not have been achieved in a 50-year span of normal activity. Such compression of scientific achievement in all fields, from engineering to medicine, both amazed and startled us. Radar, synthetics, streamlined engineering, robots, penicillin, and a host of other technical achievements came with such rapidity we no longer felt surprised when a new "secret weapon" or process was announced. The revelation of the atomic bomb climaxed all the other scientific achievements of the war and suddenly gave definitive meaning to our former, rather unanalyzed thesis the modern world is the world of science and technology.

In education, we expect that the students who will come to us will be conditioned more than ever to receive instruction in the sciences and technology. They will be science-minded and technology-minded. They will expect much from our educational institutions and they have every right to believe that we shall be adequately prepared to give them the knowledge necessary to equip them for living in the modern world. The popular expectations are sufficiently imperative that government leaders have proposed a subsidy of science research and grants-in-aid for students in science and technical curriculums.

(*Please turn to page* 220)

By DAVID D. HENRY
President
Wayne University, Detroit

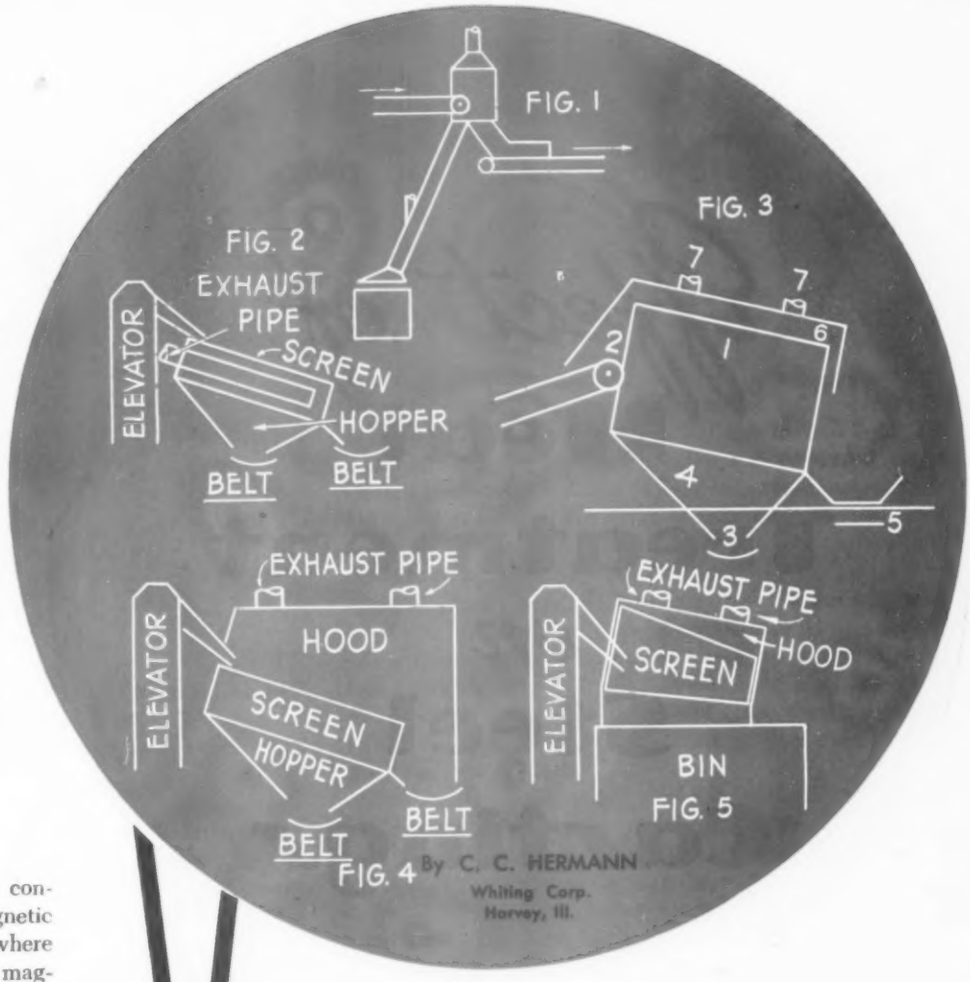


Fig. 1—Method of ventilating point where sand is transferred from magnetic pulley to cross belt

Fig. 2—Type of hood used with vibrating screen in which dust is withdrawn from below the screen

Fig. 3—Showing common method of hooding a rotary breaker

Fig. 4—Large hood located over top of vibrating screen, with exhaust at top and fresh air inlet at bottom

Fig. 5—Method frequently employed for hooding a rotating screen

Ventilating

... SEPARATORS
... BREAKERS
... SCREENS

By C. C. HERMANN
Whiting Corp.
Harvey, Ill.

TWO dust points exist in connection with the magnetic separator. The point where the sand is transferred from the magnetic pulley to the cross belt is the first and most important. The second is the discharge point of the metal picked out of the sand by the magnetic pulley. Both should be hooded and connected to the ventilating system.

The first point is covered by a sheet metal hood not unlike that used for the regular transfer point, except that more attention must be paid to accessibility for the maintenance crew. For that reason the hood is made amply large and with sides which may be removed readily by taking out several bolts. Fig. 1 illustrates a method of hooding which has proved very satisfactory. The height of the main body of the hood is equal to the width of the belt and a width equal to the belt width plus clearance at the pulley end. The bearings are left outside the hood.

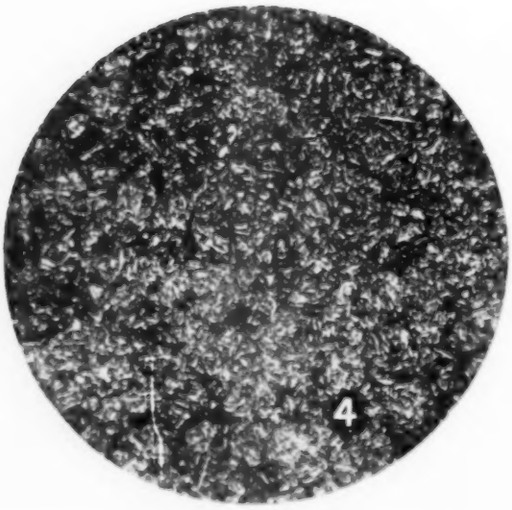
The hood is designed to incorporate the take-away belt or elevator boot, as the case may be, and in many instances the dust created by the sand distribution on this belt can be drawn up through the single pipe connection at the top. The pipe connection is made with a flare skirt and a collar. The chute carrying the metal to a receptacle below is enclosed, and a small air connection—usually a 5-in. connection is ample—is taken off the chute near the bottom.

Main air connection is designed to provide not less than 200 to 250 fpm through the total open area around the hood. It is possible to keep the total air removal at this point down to approximately 375 cfm per foot of belt width. The air velocity in the suction pipe should be not less than 3750 fpm and in the main 3500 fpm. Higher velocity would result in lower sheet metal duct cost but higher maintenance cost due to increased abrasion of the metal by the sand particles.

No definite figures can be established for these dust points, which would cover all installations since there exists a very wide selection of arrangements of belts, belt widths, manner of driving the conveyors and types of magnetic pulleys. The engineer (*Please turn to page* 215)

Effect of Heat Treatment on Steel Castings

By E. E. HOWE
Chief Metallurgist
Chicago Vitreous Enamel Product Co.
Cicero, Ill.



THE widespread need for articles made from materials having the required strength to withstand continuous and heavy loading has resulted in the diversified application of steel to secure the most satisfactory results at the least cost. Since steel is an alloy of iron and carbon with other elements present in varying amounts, its composition is not fixed unless a specific type is under consideration. The particular type or kind of steel used in any given application depends upon the design and use to which that part is put. Regardless of the type of steel selected, the conditions which govern the utility of a mechanical part may be such that the designer will specify that it be machined to the desired finished dimensions from a forged or cast piece in order to reduce waste of metal and speed up machining.

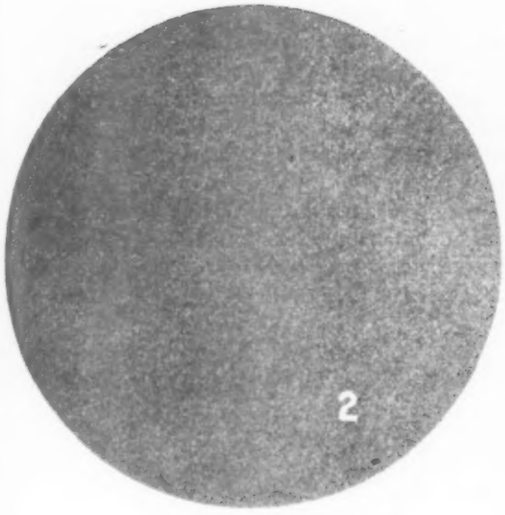
Either forging or casting of the metal produces an approximate shape of the finished part, and the designer's choice between the two methods of forming is governed by engineering dictates based on previous experience as well as physical tests. However, there is every reason to believe that full consideration has not been given to the problem of properly heat treating cast articles to bring out their maximum physical properties. If this were done,

Fig. 1—Photomacrograph of section through cast steel showing dendritic pattern of the as-cast condition. Magnification 5X; etched

Fig. 2—Same magnification of section after final heat treatment. Note absence of dendritic pattern

Fig. 3—Photomicrograph of cast steel section showing microstructure of the as-cast condition. Magnification 150X; nital etch

Fig. 4—Microstructure after final heat treatment, shown at same magnification as in preceding figure



Discussing only the basic principles of heat treating, the author presents an easily understood explanation of what happens when steel castings are heat treated and the benefits to be derived from such operations in the way of improved physical properties

castings would enjoy greater favor with design engineers and replace forgings to a great degree, because it has been demonstrated that castings, when properly processed, can replace forgings.

A brief description of the processes involved and the changes which take place in metal during heat treating will lead to a better understanding of the foregoing facts.

In order to produce a cast steel article, it first becomes necessary to select the proper analysis to obtain the desired physical properties in the finished part. Indiscrimate use of alloying elements to achieve this end is gradually being discontinued as the knowledge of their function increases. At one time, it was thought necessary to formulate steel with large amounts of nickel, chromium, manganese, etc., in order to provide the ultimate in strength, ductility, and impact resistance required of the article in service. Experience and metallurgical tests have shown this idea to be erroneous. In fact, in some instances, high alloy content can do more harm than good.

The particular type or kind of steel selected is not of interest insofar as this discussion is concerned, since practically all steel reacts in a similar manner to the heat treating procedures herein described. It should be noted, however, that careful analysis must be made of the size and shape of the article so as to provide sufficient alloy to attain uniform hardening characteristics for the maximum cross section encountered. If we assume that the composition has been established and proper refinement taken place in the melting furnace, the metal will undergo changes in structure with each subsequent operation. The starting point of these operations is the pouring of the liquid steel into the molds.

Mechanics of Steel Solidification — When steel in the molten condition is poured into molds, the metal in contact with the mold walls is chilled and solidifies. Since that phase of the liquid metal which has the highest melting point will be the first to solidify, additional cooling results in solidification of metal of relatively lower melting point. This process continues until the entire mass is completely solidified. Since the molten metal undergoes a progressive cycle, the resulting structure lacks homogeneity. This lack of uniformity is clearly revealed in microscopic examination of polished and etched specimens. With the metal undergoing continuous solidification over a range of temperatures, formation of unusual crystalline arrangements takes place. The form of segregation encountered in castings has been termed *dendritic* and derives this name from its resemblance to a tree.

Fig. 1 shows why the term *dendrite* has been applied to this structure, which is representative of its appearance when viewed under the microscope at a magnification of five diameters. Actually, it does not require a microscope to see this arrangement of crystals, since they are visible to the naked eye and in large castings they may attain a length of several inches.

Due to the fact that large crystals imbedded in a non-uniform matrix produce a weak brittle material, it is necessary to convert this structure into one made up of small, evenly dispersed crystals in a homogeneous matrix. In a forging this is partially accomplished by the working of the metal which acts in the same manner as kneading of bread. A comparable condition can be achieved by heat treating, utilizing temperature changes to bring about solution diffusion and refinement.

Heating to Obtain Homogeneity — Since steel undergoing solidification does not do so simultaneously throughout the mass, homogeneization of the resulting structure must be attained by heating the steel to a sufficiently high temperature where diffusion of the various elements can take place. To better understand how this may be accomplished, we may compare the action of the various elements in steel with that of salt in water.

If a small amount of salt is placed on the bottom of a container and water carefully poured over it, all of the salt will dissolve in the water and be completely diffused throughout the entire solution in a given length of time. A considerably greater amount of time is required for this to take place if the water is cold than if the water is heated. The same holds true with steel, which may be considered a solution of solids in solid iron. In this case the iron acts as the solvent for the alloying elements.

It has been established that the various elements in steel, even though they be in the solid state, are soluble to varying degrees as the temperature of the (*Please turn to page* 194)

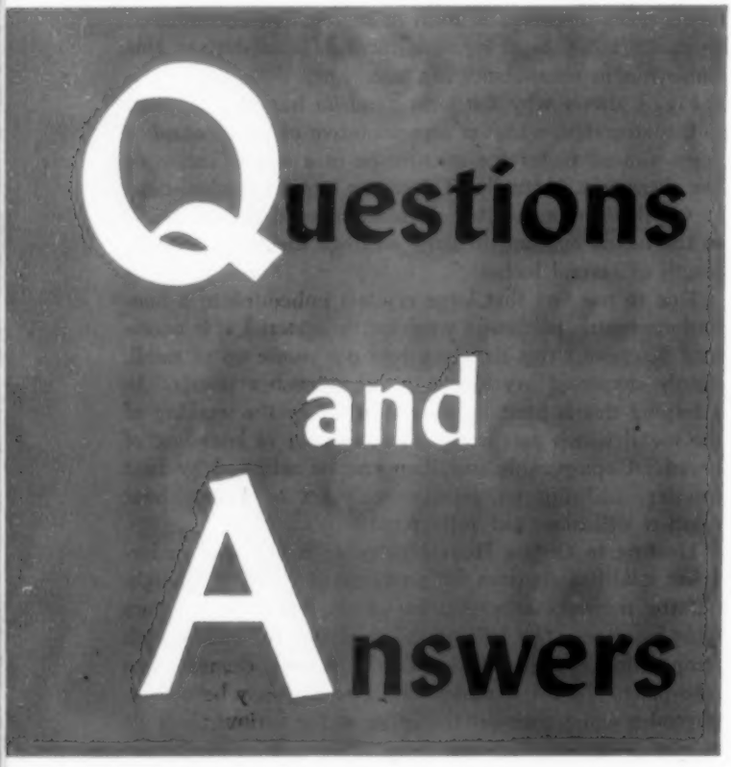
TABLE I—Results of Physical Tests on Cast 1-in. Round Test Bars

	Tensile Strength psi	Yield Strength psi	Elongation %	Reduction of Area %	Brinell Hardness
As cast	119,900	77 240	2.5	3.6	286
Normalized	138 400	87 200	6.5	10.4	277
Normalized and annealed	99 800	66 860	24 5	44 9	195
Normalized and sub-critical anneal	106 100	78 6 0	22 0	55.7	223
Normalized, annealed, hardened and drawn	155.500	141,500	14.5	40.7	332

Makes Nickel Silver Castings

Q.—We melt brass and aluminum and are thinking of adding nickel silver to our list of alloys. Can you give us any information on melting, moldings, etc. and books on the subject?

A.—As you undoubtedly know, nickel silver is a term applied to a series of alloys rather than a single one. Range of composition is from 12 to 30 per cent Ni; 5 to 6 per cent Zn; 2 to 10 per cent Pb; up to 6 per cent Sn, and remainder copper. Low nickel alloys have a yellowish color, while around 20 per cent Ni the desired white is assured. One alloy which is used considerably for plumbing fixtures, etc. conforms to Federal specifications WWP 541, which calls for 20 per cent Ni, 4 Sn, 5 Pb, 6 Zn, and 65 Cu. Pouring temperature of the alloy ranges from 2400 to 2450 F. Nickel silver is a higher shrinkage alloy than brass or bronze, hence to obtain sound castings greater attention will have to be paid to adequate feeding. In general, the riser system will have to be two to three times that required for red brass. Also it will be necessary to use larger gates than for red metal.



Good venting is essential to permit free escape of gases generated when the hot metal at high temperature comes in contact with the moist sand. A fairly open sand should be used for molding—one with about 60 permeability as measured by AFA standards, a green shear strength of 2 psi, a green compression strength of 5 psi and a moisture content about 5.5 per cent. For example, a sand with an average AFA grain fineness of 95 and a clay content of 18 per cent should be suitable. Fines in the molding sand should be kept at a minimum since they lower permeability quite rapidly. In many cases free use of the vent wire will give double insurance of adequate venting and the escape of gasses from the mold.

Deoxidation and degasification should follow a definite procedure if the best results are desired. Agents used include manganese metal (97 per cent), magnesium metal, and phosphor-copper (15 per cent) in that order. The manganese is added 5 to 7 minutes before pouring and the quantity is 1½ oz per 100 lb of nickel silver. This addition is followed by magnesium metal 3 to 5 minutes before pouring and the amount is ¾-oz per 100 lb. Final deoxidant is the phosphor-copper added just before pouring, and the amount is 2 oz per 100 lb metal.

Needs Smooth Casting Surface

Q.—What is the most suitable mold material to obtain the smoothest possible surface when pressure casting bronze and brass? By pressure casting we mean use of a head of metal or a few pounds of applied air pressure. We have been using a metal casting plaster for aluminum, but it does not seem to work satisfactorily with bronze or brass. Primarily we are interested in obtaining the smoothest surface without porosity, and not especially in strength characteristics.

A.—It seems rather odd that difficulty in securing a smooth surface on brass and bronze should be encountered when casting plaster or gypsum cement is used as the molding material. However, it is possible that the proper type of material was not tried, and it might be well to consult the manufacturer on that point. Again it might be that the plaster mix is not prepared correctly. While not critical, the mixing directions supplied by the maker of the plaster should be followed closely to obtain the best results.

Another point to consider is the patterns being used and their finish. Any marks or scratches, grain of wood, etc. will be reproduced clearly by the plaster, and of course show up on the casting surface. If the plaster is poured on the pattern so that air bubbles are incorporated at the interface, a bad surface on the casting will result. The pattern and flask should be vibrated or a stiff bristle brush used to tamp the plaster next to the pattern so that the air bubbles are removed.

Possibly the molds are not dried sufficiently to remove all the moisture. From 8 to 10 hr at 600 F should be satisfactory for brass, bronze or aluminum. With higher temperatures the time of drying can be reduced. Gates should be much smaller than for sand casting since the plaster is an insulating medium, and there is little danger of the gate freezing prematurely. Since the metal in the mold freezes slowly, it is essential that adequate feeding be provided by blind risers or shrink bobs at the proper points.

Seeks Data on Small Cupola

Q.—We are building a small cupola 10 ft high and 36 in. shell diameter. We shall appreciate information on the size and number of tuyeres and the height above the bottom; size and shape of windbox; thickness of lining; and size of fan. Since the cupola is to be operated only on short heats for repair work, can we charge it directly through the top, instead of through a charging door?

A.—Since you intend to operate the cupola only for short heats for a floor of small repair parts, the cupola you have in mind, 27 in. diameter inside the lining, is much larger

than necessary. You probably could get by with a cupola 18 or 20 in. diameter. The Aug., 1933 issue of THE FOUNDRY presented an interesting illustrated article describing a small cupola 12 in inside diameter, made up of two oil drums which melted approximately 1000 lb per hour. It was charged over the open top. This little cupola was set up near the center of the shop where the smoke, heat and sparks near the end of the heat did not come into contact with the roof.

However, if you are committed to a 27 in. diameter cupola inside the lining, the following is offered in reply to the items in your inquiry: 1—For tuyeres you have a choice between a continuous opening 2 in. high; and six tuyeres 3 x 6 in. The continuous tuyere is in 6 sections with a supporting rib in the center of each. 2—The tuyeres may be from 6 to 8 in. above the sand bed. 3—The windbox may be 12 in. greater in diameter than the shell, and extend 2 ft upward from the bottom plate. 4—A single brick wall is sufficient for a small cupola. The bricks are laid in standing on end and with the wide face on a radial line.

You will need a fan capable of delivering at least 1150 cu ft of air per minute at a pressure of 6 to 8 oz. So far as charging is concerned, nearly all small cupolas are charged in that manner. The stack above the charging area is attached merely to conduct smoke, sparks and flame away from the roof.

Method of Relieving Stresses

Q.—We are making finned cylinders for an air-cooled engine from gray iron containing 2.35 per cent Si, 0.58 cent S, 0.35 per cent Ni, and 0.71 per cent Cr. Cylinder wall is about 5/16-in., and fins are 3/32-in., thick. At present we are heat treating the cylinders to relieve stress and provide dimensional stability by heating to 1000 to 1100 F, removing from furnace, piling them together and allowing to cool. We are wondering if we can eliminate that operation by piling the castings in the molds and allowing them to cool. We have determined the cooling rate in the mold as follows: Six mintes after pouring—1100 F; 24 minutes —1050 F; 31 minutes—1000 F; 48 minutes—950 F; 60 minutes—900 F; 75 minutes—850 F; 95 minutes—825 F; 2 hours—750 F; 2½ hours—725 F; 3 hours—720 F; and 3½ hours—650 F.

A.—While the procedure you suggest of piling the molds containing the castings to still further reduce the rate of cooling appears to possess some merit, we believe that it will not give exactly the desired results. In the mold the castings are subject to various restraining forces such as generated by the body core for example, and from the pockets of sand between the fins. Those mold sections of course, will yield to some extent due to the fact that the binder for some little distance from the mold face is destroyed (we are assuming that the castings are made in core molds), but we do not believe that will be sufficient to permit free, unhindered contraction which is necessary to prevent stresses.

We believe you will have much more success by shaking out the castings hot, and placing them together in a pile—preferably in some type of enclosure to protect those on the outside from cooling effect of the atmosphere. Perhaps that might not even be necessary in view of your present practice of removing from the furnace and piling. At that we are inclined to question the latter practice since to obtain the desired results of stress relief annealing or aging if you prefer, general practice is to cool slowly in the furnace after the soaking or holding at temperature has been maintained for the desired time. Under certain conditions it is possible more stresses may be present than previous to heat treatment—especially if the castings were situated in cold air blasts.

Hence, we suggest that instead of piling the castings in the open after heat treatment, they be placed in a pit or insulated chamber where they will cool slowly. Previously it was suggested that if the castings could be removed from the mold at 1000 to 1100 F, they could be so handled, and thus eliminate the reheating. However, some experimental investigations would have to be made to determine whether it would answer the purpose. Also it might be worthwhile to investigate the necessity of any stress relief or aging. Castings made in dry sand molds cool much slower than in green sand, and might not need any treatment.

Melting in Electric Furnace

Q.—In our foundry in New Zealand we produce castings for stoves by the cupola process. The castings are thin, and we must have fluid iron. We melt 4 to 5 tons a day in a 40-in. cupola. Our difficulty is partly to get a supply of suitable coke which we get from Australia at irregular intervals due to many causes. Coke costs about $30 a ton while electric current is available at about $0.0067 per unit. Several foundries are melting steel in direct arc furnaces in this country. Some tell us that we could melt as cheaply and get satisfaction from use of an electric furnace while others say that refractory costs would make it unsatisfactory as compared to cupola melting.

A.—So many factors enter into providing a reply to your

GANGWAY! By J. A. Patterson

"Look, Gus—th' old man!"

inquiry on electric melting versus cupola melting that it can be given only in generalizations rather than concrete information backed by cold facts. Reason for this is lack of recent figures on both practices. Undoubtedly, manufacturers of electric furnaces will be glad to supply you with authoritative costs figures which you could compare with those you have on cost of cupola melting. However, it appears to us that with coke costing $30 a ton and electricity at $0.0067 per kwh, the latter would be the more favorable proposition.

Some years ago in a discussion in the *Transactions*, AFA, mention was made of a total cost, including labor, etc., for cupola metal as $16 a ton while electrically melted iron cost around $24. In those figures the cost of power ranged around 1.2 cents per kwh and although the cost of coke was not mentioned, it probably was about $10 delivered. Power consumption was given as 540 to 610 kwh per ton. Average of that is 575 kwh and 1.2 cents per kwh the cost would be $6.90 as against $3.55 at your rate of 0.67 cents per kwh. Assuming that 335 lb of coke including the bed is required to melt a ton of iron, the cost at $10 a ton for coke would be about $1.68 while at $30 for coke the cost would be $5.03. Without changing any of the other values the cost of a ton of iron melted in the cupola with $30 coke would be $19.35 while with electricity at $0.0067 per kwh, the cost would be $20.65.

However, such substitutions in calculations are far from being accurate, and may be misleading. They are presented only as a possible indication. As previously mentioned, actual costs, including such items as power consumption, electrode consumption, refractories, labor, interest, depreciation and repair data, should be obtained from furnace makers or from foundries.

With electric furnaces it is possible to use such materials as borings, punchings, etc., as part of the charge and thereby reduce raw material costs. However, skilled operators are required to obtain the best results and most economical operation. As far as refractory costs are concerned, we believe you have no reason to expect exceptional costs. Under ordinary operating conditions the costs should not be much greater than for the cupola. For your purpose we believe that continuous melting would be logical. In that practice a charge of cold metal is melted, and at definite intervals after withdrawing a certain amount of hot metal, additions of cold materials are made and brought to temperature within a few minutes.

Bronze Tablets Give Trouble

Q.—We are casting bronze tablets in sizes from 24 x 36 in. to 4 x 6 ft and are having difficulty in securing a smooth border on them. It seems to be pitted and uneven, and we would like suggestions on how to overcome the trouble or what material could be used to fill the holes. We have tried to solder and weld them, but find that due to excessive heat needed there is tendency to discolor the bronze which is not removed by sandblasting.

A.—Your mention of pitting along the edges of the tablets seems to indicate that there is an excess of moisture in that area, and we suspect that the molder is using the swab a little too freely just before drawing the pattern from the sand. When the hot metal comes in contact with the moist areas it tends to flutter, resulting in unevenness of the edges, or creates steam which blows into the metal, leaving the pits or holes. Try applying a torch around the edges to dry them. Possibly, it may be due to harder ramming around the edges which closes up the sand sufficiently to cause the troubles.

As far as salvaging those tablets already made, we do not know of any low melting point material which would have the proper color. Perhaps you can obtain one of the so-called low temperature welding or brazing alloys which will give a good color match. These alloys are claimed to require much lower temperatures for manipulation than for the standard compositions. So far as heat discoloration is concerned, we believe that you can remove it by acid treatment. If the tablets are not too large, they can be dipped in a mixture of nitric and sulphuric acids; ferric sulphate and sulphuric acid, etc. You could try rubbing the discolored portions with fine sand, which is applied with a piece of waste or copper wool such as used for cleaning kitchen utensils, dipped in dilute sulphuric acid. Rubber gloves will have to be used to prevent acid burns.

Castings Leak Under Pressure

Q.—We have been making a small cover for an oil filter about 4 in. square. It is ⅛-in. thick, but increases in thickness toward the edge where it is ¼ and then 5/16-in. The castings leak when subjected to 60 lb air pressure test. Analysis of the iron shows: Si 2.43 per cent, S 0.06 per cent, P 0.50 per cent, Mn 0.57 per cent, TC 3.50 per cent. The leakage appears in the ¼-in. section near where it joins the ⅛-in. section. Transition in thickness is gradual. We shall appreciate your opinion on the probable cause of and remedy for this trouble.

A.—While we would prefer to see the castings, we are willing to suggest the cause of your trouble. Analysis of the iron is quite satisfactory. In fact the composition of the iron is not a factor of any importance in the present problem. For this particular job your sand is not quite permeable enough. The four castings, the sprue and the gates presumably in the center, practically form a sheet of metal across the face of the mold. All the steam and gas must travel down through the drag and escape between drag and bottom board.

With high permeability sand the steam and gas escape readily. With low permeability (tight is the shop term) some of the steam works up through the metal. This sets up a fluttering action, more or less violent depending on the amount of steam and the time the metal remains liquid. In severe cases the result shows up in bubbles and quite visible blowholes in the casting. In mild cases the steam is trapped in microscopic cavities not visible to the naked eye, but sufficient in combined area to permit leakage under pressure. Possibly the sand contains too much moisture, either acquired in the mixing process, or through a too liberal application of the swab.

Two remedial measures are available. Selection of one or the other depends on the daily output. Where the output is limited or intermittent the present sand may be employed, provided the drag is vented all over with a wire before it is rolled over. If the job is in the production class a more open sand should be employed in the drag, with a permeability of 60 to 70 and a moisture content of not over 5 per cent.

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1 **NICKEL** is readily soluble in iron, forming a series of useful engineering cast irons containing up to 38% Nickel.

2 **NICKEL** is available in several appropriate forms to suit individual foundry needs.

3 **NICKEL** may be charged directly into the furnace and recovered in returns without appreciable loss. You get back what you put in.

4 **NICKEL** controls the structure of cast iron to improve mechanical properties, machinability and service performance.

By suitable additions of Nickel, alone or in combination with other alloys, to a correct base mixture, the useful life of virtually any engineering cast iron may be greatly lengthened. Counsel and data are available upon request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N. Y.

MEN of Industry

HARRY W. HOLT

HARRY W. HOLT, since 1941 vice president in charge of sales, Wilson Foundry & Machine Co., Pontiac, Mich., has been made vice president and assistant general manager in addition to his present duties. Mr. Holt has been associated with the foundry industry for almost 35 years. From 1911 to 1918 he served as production and sales manager, Aluminum Castings Co., Cleveland, when he joined Bohn Aluminum & Brass Corp., Detroit. He remained with the latter company until 1938, during which time he served as vice president and sales manager, prior to his association with Wilson Foundry.

♦ ♦ ♦

TOM J. OWEN

Tom J. Owen has been placed in charge of the New York office of the National Founders Association, succeeding **Charles Seman,** who has entered private industry. Mr. Owen has had many years of experience in the foundry industry and association work. He was secretary-manager of the American Gear Manufacturers Association for 10 years and more recently completed 13 years with the Gray Iron Founders' Society.

♦ ♦ ♦

Adolphus H. Brown, until recently night superintendent of the Cleveland sand foundry and permanent mold plants, Aluminum Co. of America, Pittsburgh, has been appointed general superintendent of the sand foundry, Parkway Foundry & Machine Corp., Brooklyn, N. Y. Mr. Brown attended Birmingham Southern University and served his apprenticeship as a bench molder in the brass foundry, Ohio Pattern Works, Cincinnati. Later he spent six years as molder, salesman and foreman with F. E. Cushman Foundry Co., of the same city, and two and a half years as foreman of the brass foundry, Grabler Mfg. Co., Cleveland. Mr. Brown was associated with the Cleveland plant, Aluminum Co. of America, for the last 17 years.

♦ ♦ ♦

Richard C. Crouch has been appointed secretary and treasurer, as well as a member of the board of directors, Acme Aluminum Alloys Inc., Dayton, O., succeeding **William C. Lewis,** who has resigned to enter business for himself. Mr. Crouch joined the Acme organization in March, as comptroller, following three years of service in the aviation branch of the Navy as lieutenant commander.

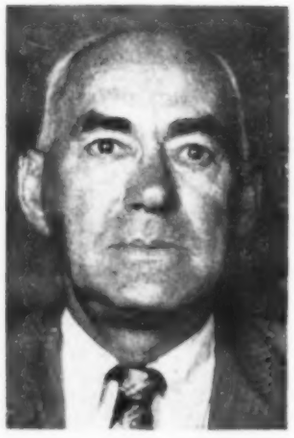
♦ ♦ ♦

Earl M. Strick, newly elected chairman of the Northwestern Pennsylvania Chapter of the AFA, has spent 33 years in the foundry industry. He joined Erie Malleable Iron Co., Erie, Pa., in 1913 as time clerk, later became hard iron inspection foreman, chief inspector, night foundry superintendent, and at present is finishing superintendent. He has also been connected with the purchasing, statistical, cost and accounting departments of the company. Mr. Strick attended the University of Pittsburgh, Erie Center. He was one of the organizers of the Northwestern Pennsylvania Chapter, serving as its vice chairman last year. He is also a past director of the National Association of Cost Accountants.

♦ ♦ ♦

Donald B. Phillips has left Bendix Products Division of Bendix Aviation Corp., South Bend, Ind., where he was

(*Continued on page* 106)



ADOLPHUS H. BROWN

RICHARD C. CROUCH

EARL M. STRICK

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

General Sales Offices

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(*Continued from page 104*)

foundry process engineer since 1941, and is now assistant superintendent of the foundry at Lobdell-Emery Mfg. Co., Alma, Mich. From 1937 to 1941 he was with Chevrolet Gray Iron Foundry Division, Saginaw, Mich.

♦ ♦ ♦

Steven Garry, general foreman in charge of the small core room, Caterpillar Tractor Co., Peoria, Ill., since 1942, has joined the company's labor relations department. Mr. Garry has been associated with Caterpillar for 16 years, the last 12 in a supervisory capacity. **Louis Voris,** supervisor in the small core room for the last 11 years, succeeds Mr. Garry as general foreman.

♦ ♦ ♦

C. H. Welch has been appointed plant manager, the Alloy Cast Steel Co., Marion, O. Mr. Welch has been superintendent of the company since 1928. Prior to that time he was associated with Commercial Steel Casting Co., Marion, O., as plant engineer. In his new position he succeeds **W. A. Dorsey** who retired recently as vice president and works manager. **J. E. Gickler,** assistant superintendent since 1942, has been appointed superintendent to succeed Mr. Welch.

♦ ♦ ♦

Frank D. Bromley has been appointed foundry superintendent, Howe Scale Co., Rutland, Vt. Mr. Bromley had been associated with the Navy Department at Newport, R. I., as improvement and methods man, for the last 12 years. He began his foundry career at Draper Corp., Hopedale, Mass., and attended Massachusetts Institute of Technology.

♦ ♦ ♦

S. J. Almasy has been appointed general foundry foreman, Sterling Faucet Co., Morgantown, W. Va. Mr. Almasy has been connected with the foundry industry since 1902, when he joined Dayton Malleable Iron Co., Dayton, O. He later worked as an apprentice coremaker at Hill Clutch Foundry, Cleveland, and in the last 40 years has been associated with many ferrous and nonferrous foundries throughout the country as coremaker, molder and foreman.

♦ ♦ ♦

R. C. Osgood, chief engineer and manager of the hoist division, and **J. A. Drain,** vice president in charge of engineering for Joy Mfg. Co., received special recognition as a part of the Naval Ordnance Development Award recently conferred on Sullivan Division of Joy Mfg. Co., Michigan City, Ind., for distinguished service to the research and development of naval ordnance. The work of the late **Alton Hilliard,** assistant to Mr. Osgood, was recognized in a similar award to his widow.

♦ ♦ ♦

Anthony Lebesch, superintendent, No. 1 gray iron foundry, Allis-Chalmers Mfg. Co., Milwaukee, has been made assistant general superintendent of the company's No. 1, No. 2 and brass foundries. Mr. Lebesch joined Allis-Chalmers in 1924 as an apprentice and has an extensive background in gray iron foundry operations. **Gustave Hintz** succeeds Mr. Lebesch as superintendent of the No. 1 gray iron foundry. Mr. Hintz has been associated with Allis-Chalmers since 1912 and was formerly Mr. Lebesch's assistant.

♦ ♦ ♦

Alfred L. Boegehold, head of the metallurgy department, Research Laboratories Division, General Motors Corp., Detroit, has been nominated for president, American Society for Metals, for the year 1946-47. Mr. Boegehold is a graduate of Cornell University and has been with General Motors since 1925. Prior to that he was associated with Remington Arms Co., and Bridgeport Brass Co., both of Bridgeport, Conn. He is a past chairman of the Detroit Chapter of the society and delivered the Campbell Memorial Lecture before the ASM in 1938. **Francis B. Foley,** nominee for society vice president, is superintendent of research, Midvale Co., Nicetown, Philadelphia. Mr. Foley was graduated from Girard College and joined Midvale Co. in 1905. Later he taught metallography at the University of Minnesota, and engaged in research projects for the U. S. Bureau of Mines. In 1926 he returned to Midvale Co. as superintendent of research. He is past chairman of the Philadelphia Chapter of the Society. Formal elections and induction into office will take place at the annual meeting in November.

♦ ♦ ♦

Donald A. Potter has been appointed research and development engineer, Universal Castings Corp., Chicago. Mr. Potter, a graduate of Notre Dame University, was at the Naval Research Laboratory, Washington, in the castings section of the Division of Physical Metallurgy, during the recent war. While there he was engaged in research on special alloy steels and was in charge of the development and research work on precision casting of ferrous and nonferrous alloys. Prior to Navy service he was associated with E. C. Atkins Co., Indianapolis, for two years, as a chemist and metallographer.

♦ ♦ ♦

Edwin R. McPherson, until recently plant engineer and general superintendent of maintenance, construction and services, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has been appointed plant engineer, Wilson Foundry & Machine Co., Pontiac, Mich. Previous connections included executive engineering positions with Packard Motor Car Co., Crosley Corp., and Wright Aeronautical Corp. **Francis W. Gardner** has been appointed head of Wilson's standards department. Mr. Gardner served with the Engineering Corps during the recent war, holding the rank of major. He was formerly a vice president of man-

(*Continued on page 110*)

STEVEN GARRY

C. H. WELCH

J. E. GICKLER

MODERN DESIGN GIVES 10% EXTRA CAPACITY*

Today's indispensable team-mate of mass production is mass handling of materials, finished products and goods to process. And many producers and transporters are finding the answer in the pallet load system, handled by flexible, cost-saving electric trucks, powered with Philco extra capacity batteries. This extra capacity of 10% or more — an original Philco development — is now available in several modern Philco types, including the famous Philco "Thirty", the battery with 30% longer life. Write for specification data today. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.

Modern construction... pioneered by Philco... gives 10% or more additional battery capacity.

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FOR FIFTY YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

45,000 pounds...

Wheelabrated in

No wonder Mr. Leslie Neville, owner of the Neville Foundry Co., North Kansas City, Missouri, is all smiles! He has just seen an almost unbelievable heap of castings literally vanish out of sight—in a steady procession through the newly installed 36″ x 42″ Wheelabrator Tumblast. Only a few hours before almost 100 tons of castings, an accumulation of several days pouring, were piled in every available space in the foundry awaiting cleaning.

Twenty four tons of this pile were spotlessly cleaned in just 3 hours and 12 minutes operating time of the Wheelabrator Tumblast. 1000 pounds Wheelabrated every four minutes!

Contrast this cleaning efficiency with their former methods: Four large tumbling mills, six men to load them in addition to the one man working exclusively on the mills, with the noise and dust inherent in this type of cleaning. Overtime labor was excessive since the cleaning room of necessity worked all day Saturday and Sunday to catch up with production.

Now castings are cleaned the same day they are poured. And they are actually clean. "Our castings come out of the Wheelabrator looking as if they had been given a coat of aluminum."

Cleaning costs have been drastically reduced, floor space formerly required for cleaning is utilized for more productive operations and the efficiency of the whole foundry has been stepped up due to the installation of the Wheelabrator Tumblast.

in three hours

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NOrclay 3535

NEVILLE FOUNDRY CO., INC.
2012 Burlington Street
NORTH KANSAS CITY 16, MISSOURI
— MANUFACTURERS —
Phone
NOrclay 353

Wood and Metal Patterns -:- Gray Iron -:- Semi-Steel and Alloy Castings

February 12th 1946

Mr. J. F. Underway
American Foundry Equipment Co.
Mishawaka, Indiana

Dear Joe:

I want to take this opportunity of thanking you and your Company for the fine installation covering our 36"x42" Wheelabrator Tumblast and Dust Collector.

I appreciate very much the cooperation and engineering assistance which you gave us. We are indeed greatly pleased with the operation of this machine and the results attained.

Prior to the installation of the wheelabrator, we operated four tumbling mills which required the service of one man during the entire day. Due to the noise and dust it was impossible for our grinding crew to work with any degree of satisfaction.

On our first day's operation of the wheelabrator we cleaned 48,000# of castings in 3 hours and 12 minutes of running time. There was no noise or dust with the operation and our castings came out looking as if they had been given a coat of aluminum paint. We feel that we are now in a position to give our customers a product which we will be proud of and at the same time at a considerable savings over previous cost. We are glad to recommend the wheelabrator and want you to feel free to demonstrate this machine to any of your prospects.

Yours very truly,

NEVILLE FOUNDRY CO., INC.

By W. L. Neville

W. Leslie Neville, Pres.

Mr. Leslie Neville, owner of the Neville Foundry Co.

ARMY NAVY
THE AMERICAN MOLDER
TRADE MARK REG U S PAT OFF

American
FOUNDRY EQUIPMENT CO.
505 S. Byrkit Street, Mishawaka, Indiana
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

(*Continued from page* 106)

agement engineering, Research Institute of Detroit, and a layout engineer, Dodge Co. of Chicago. He also has done industrial engineering counseling and surveying in a number of plants throughout the country.

♦ ♦ ♦

H. M. Patton, recently elected chairman of the Twin City Chapter of the American Foundrymen's Association, is foundry superintendent, American Hoist & Derrick Co., St. Paul. Mr. Patton is a native of Lima, O., and a graduate of Ohio State University. From 1929 to 1937 he was engaged in foundry work at Ohio Steel Foundry, Lima, O., and American Steel Foundries, Indiana Harbor, Ind., when he became foundry superintendent, Superior Steel & Malleable Casting Co., Benton Harbor, Mich. He joined American Hoist & Derrick Co. in 1942.

♦ ♦ ♦

Roland S. Higgins has been appointed sales representative and head of the Detroit branch office, Hydropress Inc., New York. Mr. Higgins was engaged in sales engineering for many years, representing Pullman Car & Mfg. Co., Kennedy-Van Saun Engineering Co., Whiting Corp., Darling Valve & Mfg. Co., and Continental Roll & Steel Foundry Co. among others. During the recent war he was assigned to the office of Chief of Ordnance, Detroit, holding the rank of major.

♦ ♦ ♦

J. William Barker has been appointed a vice president and general manager of the Industrial Furnace Division, Loftus Engineering Corp., Pittsburgh. Mr. Barker, formerly with Stein-Atkinson Ltd., London, England, and Chapman-Stein, Mt. Vernon, O., was one of the founders of Rust Furnace Co. and an active member for 15 years.

♦ ♦ ♦

Mathieson Alkali Works, New York, has announced a number of sales territorial changes and appointments. **Harold R. Dinges** has been named district sales manager of a new southern sales area comprising Virginia, North and South Carolina and parts of West Virginia and Tennessee, with headquarters at Charlotte, N. C. Mr. Dinges, a former member of the company's sales development department, joined the company in 1941. **O. J. Theobald Jr.**, a member of the organization since 1932 as sales representative, will assist Mr. Dinges.

♦ ♦ ♦

Fred O. Tilson, district sales manager of a new southern area comprising parts of Tennessee, Alabama and Georgia, will have headquarters in Chattanooga, Tenn. Mr. Tilson, who joined the company in 1925, has been engaged in varied sales capacities for Mathieson since that time. **William H. Eastburn** heads a new sales area in New England, as district sales manager, with headquarters at Providence, R. I. Mr. Eastburn joined the company's sales staff in 1932.

♦ ♦ ♦

Brig. Gen. Donald Armstrong, commandant, Industrial College of the Armed Forces, Washington, has retired from the Army, following 36 years of service. He has joined the staff of the American Standards Association, New York, and will assist **Howard Coonley,** chairman of its executive committee, in expanding and developing activities of the association. His work will deal particularly with the enlarged responsibilities which the Policy Committee on Standards will undertake, under the chairmanship of Charles E. Wilson.

♦ ♦ ♦

Stephen H. Newburn has been appointed manager of the Detroit district, Air Reduction, New York, succeeding **G. J. Dekker,** who has been elected a vice president of Ohio Chemical & Mfg. Co., subsidiary of that organization. Mr. Newburn, a graduate of Penn State University, joined Air Reduction in 1936 as a district representative in Pittsburgh. He was made assistant sales manager at Cleveland in 1944 and was promoted to manager in 1945. Mr. Dekker has been associated with the parent company since 1919. He was appointed assistant manager of the Detroit district in 1931. After serving briefly as manager of the Oklahoma district he returned to Detroit, as manager, in 1940. **A. C. Brown Jr.,** has been appointed manager of the Cleveland district, to succeed Mr. Newburn. Mr. Brown has recently been released by the Army, after five years of military service, with the rank of captain. He joined Air Reduction in 1935, serving the company as salesman and later as branch manager at Grand Rapids, Mich.

♦ ♦ ♦

Clifford A. Patch has been appointed sales manager, western division of Joshua Hendy Iron Works, Sunnyvale, Calif., succeeding **Clarence Jensky,** who has resigned to enter private business. Mr. Patch will supervise sales of products manufactured by the company at the Sunnyvale and Torrance plants. **Charles A. Flannery** has been appointed general products sales manager, as assistant to Mr. Patch.

♦ ♦ ♦

Henry A. Mullen, formerly resistance welding field engineer in Detroit for Ampco Metal Inc., Milwaukee, has been appointed manager of resistance welding sales. Prior to his association with Ampco, Mr. Mullen was welding engineer with the Willow Run plant of Ford Motor Co.

♦ ♦ ♦

Foxboro Co., Foxboro, Mass., has announced a number of branch office appointments, following release of technically-trained men from military, industrial and scientific work of wartime urgency. **Robert E. Rogers** has been named branch manager, and **Mark B. Bagley,** service engineer, at Los An-

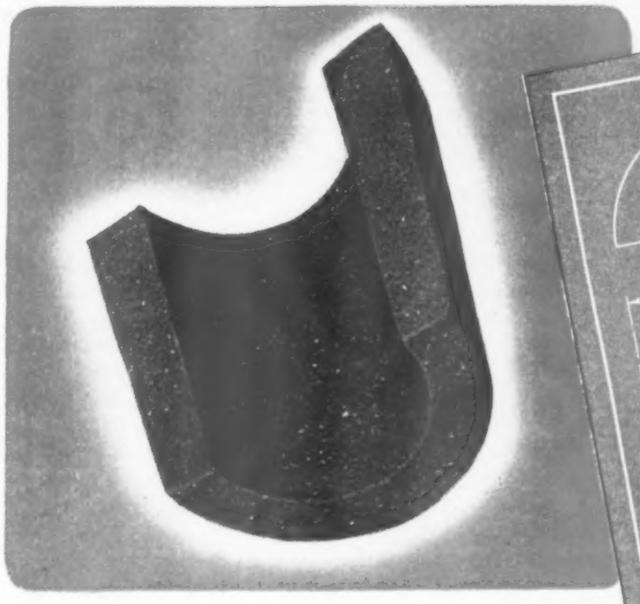
(*Continued on page* 112)

H. M. PATTON

ROLAND S. HIGGINS

J. WILLIAM BARKER

How Long will a CARBON CINDER NOTCH LINER Last?



IF INSTALLED properly, there is no reason why a cinder notch liner made of "National" carbon should not last for *many years!* Why?

Because "National" carbon is totally unaffected by corrosive slag attack or by thermal shock. And because, being made of only two pieces, the carbon liner has only two joints! (This feature also makes the carbon cinder notch quick and easy to install.)

Send for more details! Engineers at National Carbon are ready to assist in the design of a carbon cinder notch for your particular furnaces. Write to Dept. **FY.**

• • •

Entirely unaffected by corrosive slags.
Unharmed by thermal shock.
Easy to install—fewer joints.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation
The word "National" is a registered trade-mark of National Carbon Company, Inc.

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Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

(*Continued from page* 110)

geles. Prior to military service they served the company as engineers in New York and Foxboro, Mass., respectively. Appointments to the Chicago office include **John W. Fulton,** service engineer. **Richard P. Parshall** and **Joseph J. Connelly,** sales engineers. Mr. Fulton was at Foxboro main factory before service in Army Ordnance. **John M. Waters,** until recently in the construction division of Petroleum Administration for War, has been named sales engineer and will reopen the Birmingham office. **Edward E. Pettibone** and **Hubert G. Morgan** have been appointed sales engineers at Cleveland and Cincinnati, respectively. **John L. Pierce** will cover the Florida and Carolina territory, as sales engineer at Atlanta, and **John W. Garden** becomes sales engineer at Pittsburgh. **Paul A. Hilli,** industrial engineer before entering the Navy, is now resident engineer at Hartford, Conn.

♦ ♦ ♦

George L. Bauer, Charleston, W. Va., has been appointed eastern division manager for Kerkling Industrial Division, Chicago, under the direction of **A. B. Tincher,** industrial manager. Mr. Bauer has a 14-year background of automotive manufacturing and engineering.

♦ ♦ ♦

Carl L. Kishman, formerly with the Cortland Grinding Wheel Corp., Chester, Mass., is now with the General Allied Metals Co., Burbank, Calif., as district manager in charge of operations in the Mid-Western states.

♦ ♦ ♦

Alexander D. Barczak, formerly of the foundry division, Bardes Forge & Foundry Co., Cincinnati, has been named vice president of the company. Mr. Barczak came to the organization five years ago from General Motors Corp. **Clarence J. Stewart,** formerly of Johnstown, Pa., succeeds Mr. Barczak as foundry division manager.

♦ ♦ ♦

Noble L. Mooneyham has been appointed western district sales manager, Velsicol Corp., Chicago, to handle sales of insect toxicants, solvents, resins and core oils. Mr. Mooneyham, who is also in charge of nationwide core oil sales for the company, is an active member of the Chicago Chapter of the AFA. He joined Velsicol in 1935 and has served in an executive capacity since 1938.

♦ ♦ ♦

Dr. William A. Mudge, assistant director of the New York Technical Section of the Development and Research Division, International Nickel Co. Inc., has been elected chairman of the New York Chapter of the American Society for Metals, for the year 1946-47. Dr. Mudge has been chairman of the Technical Program Committe of the chapter during the last year. He is the author of many technical papers on nickel and nickel alloys.

♦ ♦ ♦

Walter P. Berg has been appointed general manager of the machinery division, Dravo Corp., Pittsburgh, succeeding **W. K. Fitch,** who has been made chairman of the board of directors. Mr. Berg, a graduate of Lehigh University, joined the company in 1923 as an assistant engineer. Since 1938 he has been in charge of the power department of the machinery division.

♦ ♦ ♦

Frank J. Wood has been appointed chief engineer of the rolling mill division, Loewy Construction Co. Inc., New York. Mr. Wood had been associated with Goodman Mfg. Co., Chicago, for the last ten years as chief engineer of the industrial division where he specialized in the design of special equipment for the ferrous and nonferrous industries.

♦ ♦ ♦

William A. Scheuch, vice president, Nassau Smelting & Refining Co., Tottenville, Staten Island, N. Y., has been elected president, succeeding **Frederic W. Willard,** retired. **George J. Boileau,** treasurer, becomes vice president and succeeds Mr. Willard on the board of directors. **Edmund F. Baxter** has been elected treasurer in addition to his duties as treasurer of Western Electric Co., the parent company, and **Elmer F. Stocker,** assistant treasurer. Mr. Scheuch joined the Bell System, of which the Nassau company is a part, as a metallurgist in 1916, and has been with Nassau Smelting since 1931, serving as vice president and director since 1939.

♦ ♦ ♦

R. S. Stover has been appointed supervisor of the Philadelphia-Washington district, Ampco Metal Inc., Milwaukee, with headquarters in Philadelphia. Mr. Stover was formerly district manger of the Washington office. **Elmer E. Whitson** will remain as Philadelphia district manager.

♦ ♦ ♦

Arthur Batts, president, Carborundum Co., Niagara Falls, N. Y., has been elected to the board of trustees of the Industrial Hygiene Foundation. Mr. Batts will represent the grinding wheel industry, which has been identified with the foundation since its organization 11 years ago, on the foundation's board.

♦ ♦ ♦

Kenneth H. Hobbie, Chicago district manager, Driver-Harris Co., has been elected president of the Chicago Technical Societies Council for 1946-47. He is one of the founders of the council, organized three years ago.

♦ ♦ ♦

Jerome S. Szymanski has been appointed Wisconsin sales representative, Western Metal Co., Chicago. Mr. Szymanski, a graduate of Marquette University was chief chemist, Cochrane Laboratories, Milwaukee, until recently.

♦ ♦ ♦

R. F. Muller, sales engineer in the New Orleans district office of Allis-Chalmers Mfg. Co., Milwaukee, has been made assistant manager of that office. A graduate of Tulane University, he has been associated with the company since 1920.

♦ ♦ ♦

Alton P. Hall has been elected vice president, American Chain & Cable Co. Inc., Bridgeport, Conn. Mr. Hall will continue his present duties as general manager of sales with headquarters at

(*Concluded on page* 114)

R. B. TEMPLETON

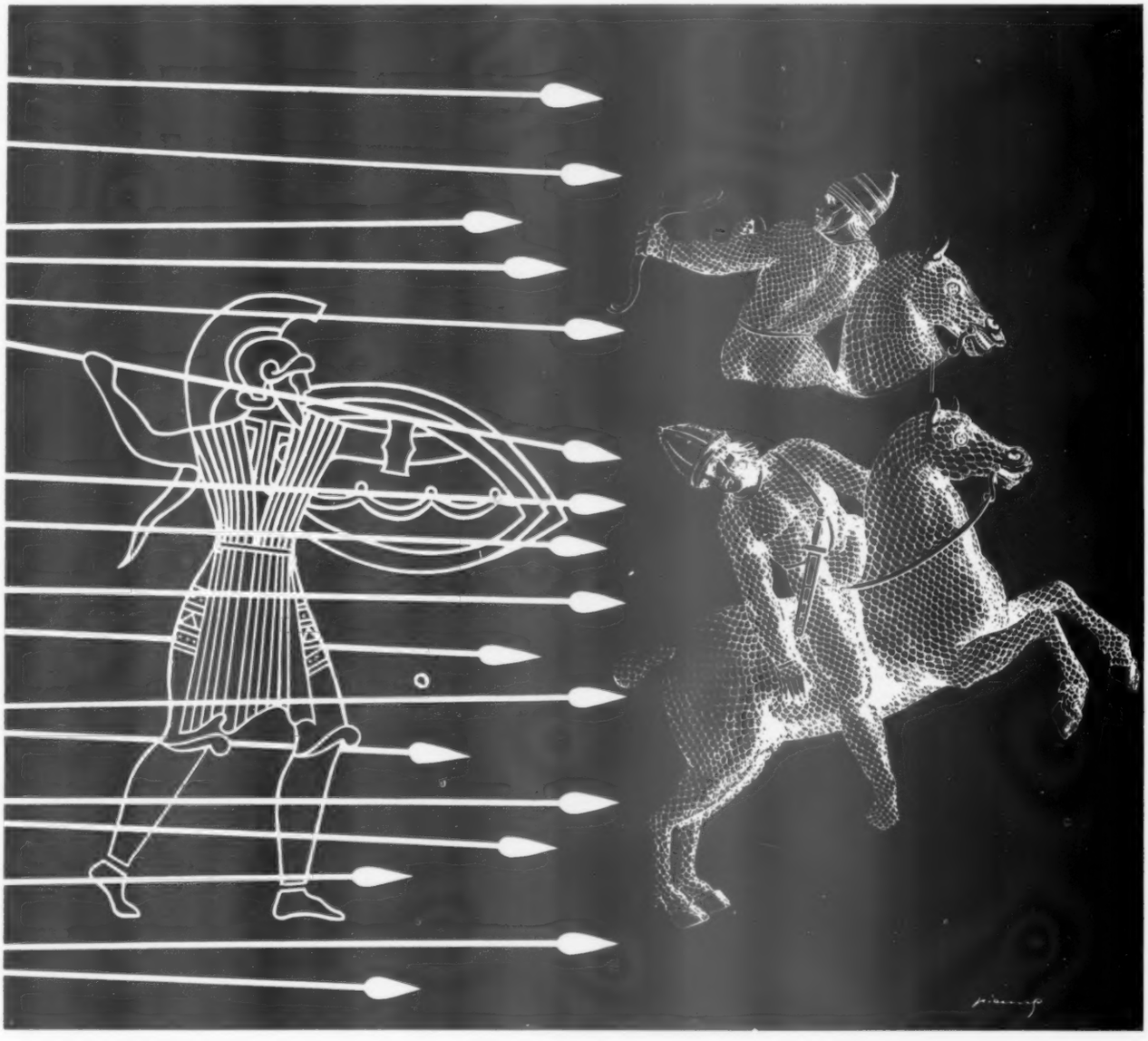
P. H. WILSON

Newly elected vice presidents of the Institute of British Foundrymen, as reported in THE FOUNDRY for August. Mr. Wilson was chosen senior vice president and Mr. Templeton junior vice president.

THE MACEDONIAN SURPRISE PARTY

When the proud Persian hordes plunged headlong at Philip of Macedon's army, they were dumped into the minor leagues by an entirely new strategy, the phalanx: a solid wall of warriors sixteen ranks deep. Strength-in-depth withstood and defeated the impact of an over-confident enemy.

Molybdenum cast steels are economical means of getting the strength-in-depth called hardenability. With it, you're assured of dependable performance under severe service conditions. Practical facts are available to show you where molybdenum can go to work for you.



MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

(*Concluded from page* 112)

230 Park Ave., New York. A graduate of Princeton University, he joined the company in 1944, after having spent 22 years in the steel industry.

♦ ♦ ♦

J. L. Holloway, formerly vice president in charge of the finance and control division, Crane Co., Chicago, has been elected president to succeed **John H. Collier,** who has been advanced to chairman, the post held by the late J. B. Berryman. The responsibilities of P. R. Mork, executive vice president, have been expanded. C. R. Crane II, vice president, becomes a director to succeed Mr. Berryman.

♦ ♦ ♦

R. W. Gillmore has been appointed manager of a new Evansville, Ind. branch office of Allis-Chalmers Mfg. Co., Milwaukee. Mr. Gillmore, a graduate of Tufts College, has been associated with Allis-Chalmers' Indianapolis district office since 1935, as sales engineer. He served for over three years in the Navy and held the rank of lieutenant commander when he was released in 1945.

♦ ♦ ♦

Clyde Williams, director of Battelle Memorial Institute, Columbus, O., has been presented an honorary degree of Doctor of Science by University of Utah, Salt Lake City, in recognition of his wartime and peacetime contributions to American technology and for his activities in directing the War Metallurgy Committee of the National Academy of Sciences and National Research Council.

♦ ♦ ♦

Maj. Carl R. Tufts, recently released from active duty by the Army Ordnance Department, has joined the Detroit staff of the Baker Industrial Truck Division, Baker-Raulang Co., Cleveland. Prior to entering the Army he spent 16 years with Edison Storage Battery Co., as service engineer and sales engineer of the Detroit branch and later as Cincinnati branch manager.

♦ ♦ ♦

Frederick H. Neuhardt has been appointed sales manager of the industrial division, Eastern Metal Products Co., Tuckahoe, N. Y. Mr. Neuhardt was formerly associated with General Electric Co.

♦ ♦ ♦

Maj. Goff Smith, former executive officer of the Chicago Ordnance District, has been released from service and has joined the railway sales department, American Steel Foundries, Chicago.

♦ ♦ ♦

R. S. Stover, formerly district manager of the Washington office of Ampco Metal Inc., Milwaukee, has been appointed supervisor of the Philadelphia-Washington district, with headquarters in Philadelphia. **Elmer E. Whitson** continues as Philadelphia district manager.

♦ ♦ ♦

George W. Kuracheck, until recently foundry metallurgist, Wright Aeronautical Corp., Paterson, N. J., has been appointed assistant foundry superintendent, Castalloy Co. Inc., Cambridge, Mass.

♦ ♦ ♦

C. D. Barr, since 1937 vice president and secretary, American Cast Iron Pipe Co., Birmingham, has been made president, to succeed **W. D. Moore,** who has retired after serving as company president for 22 years. Mr. Moore joined the firm in 1908 as a mechanical engineer. **S. D. Moxley,** formerly chief engineer, has been made vice president in charge of purchasing and engineering. **J. J. Swenson** has been appointed vice president in charge of sales and secretary, and **F. B. Shannon,** until recently purchasing agent, has been named assistant secretary. **C. O. Hodges** is treasurer of the company.

C. D. BARR

♦ ♦ ♦

Albert L. Fairley Jr. has joined the Shenango Furnace Co., Pittsburgh. Mr. Fairley served as assistant deputy director, Steel Division, WPB, from 1941 to 1943. He was an officer in the Army Air Forces in the war period, remaining after his tenure with WPB.

♦ ♦ ♦

Harold W. Roher, until recently manager of transmitting tube sales, Westinghouse Electric Corp., Pittsburgh, has joined the sales staff of Machlett Laboratories Inc., Springdale, Conn., in charge of the renewal sales department.

♦ ♦ ♦

Robert J. McGreevy, recently discharged from the Navy where he served as a lieutenant in the Materials Handling Section, Bureau of Supplies and Accounts, has returned to the Yale & Towne Mfg. Co. and has been appointed assistant district manager of industrial truck sales-engineering for the metropolitan New York area.

♦ ♦ ♦

Glenn W. Merrefield, for the last three years works manager, Chicago Hardware Foundry Co., North Chicago, Ill., has been appointed senior engineer, Lester B. Knight & Associates, Chicago. Mr. Merrefield served an apprenticeship at American Steel Foundries, Indiana Harbor Works, followed by varied foundry experience in steel, gray iron and nonferrous branches of the industry. Recent connections include Clark Equipment Co., Buchanan, Mich., Kay-Brunner Steel Products Inc., Alhambra, Calif., Continental Foundry & Machine Co., American Steel Foundries Cast Armor plant, prior to his association with Chicago Hardware Foundry Co. Mr. Merrefield is an active member of the American Foundrymen's Association and former vice chairman of the Southern California Chapter.

♦ ♦ ♦

Dr. James S. Owens, until recently administrative head of physics research at Randall Laboratory, University of Michigan, has been appointed executive director of the Ohio State University Research Foundation, succeeding **Dr. A. R. Olpin,** who has accepted the presidency of the University of Utah.

♦ ♦ ♦

P. A. Alers has been appointed manager of the El Paso, Tex., office, Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Alers, who was graduated from the School of Mining Engineering, University of Wyoming, has been connected with Worthington since 1933.

♦ ♦ ♦

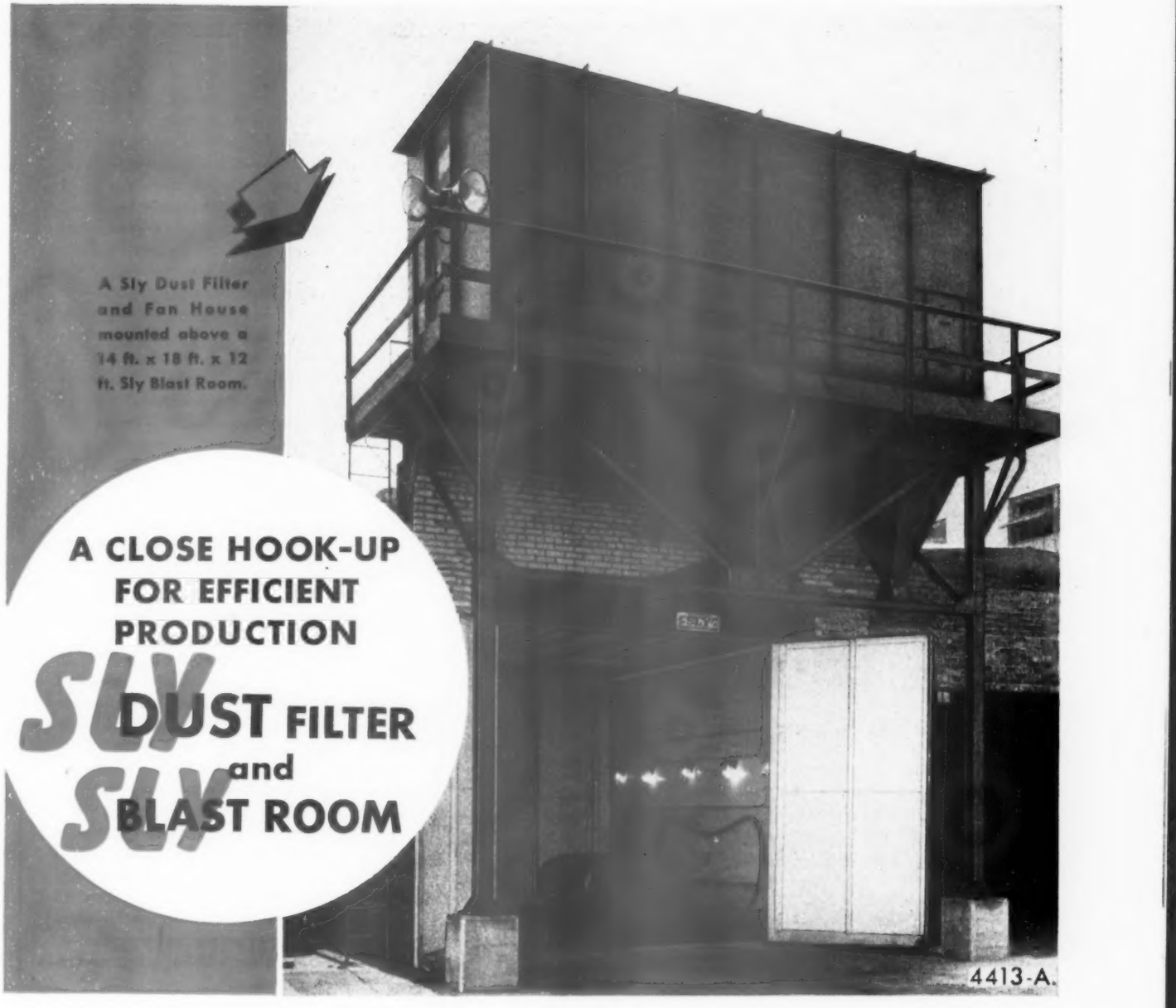
Jay T. Ford has been appointed chief chemist, Gerity-Michigan Die Casting Co., with headquarters at the Adrian, Mich., division. Mr. Ford had been chief chemist, AC Spark Plug Division, General Motors Corp., Flint, Mich., for the last 21 years.

♦ ♦ ♦

William J. Grede, president of Grede Foundries Inc., Milwaukee, has been elected a director of the National Association of Manufacturers. Mr. Grede is now president of the Wisconsin Manufacturers' Association.

♦ ♦ ♦

Lt. Comdr. Albert O. Vogel, after more than three years of service with the Navy, has returned to the Vilter Mfg. Co., Milwaukee, and has been appointed assistant to the president.



A Sly Dust Filter and Fan House mounted above a 14 ft. x 18 ft. x 12 ft. Sly Blast Room.

A CLOSE HOOK-UP FOR EFFICIENT PRODUCTION

SLY DUST FILTER and SLY BLAST ROOM

THIS is a unique and effective combination of a Sly Dust Filter and a Sly Blast Room.

The dust filter with fan house is 18 feet long, mounted on a suitable support. Walkway and railing are standard Sly equipment.

The filter is mounted over the entrance, preventing rain from entering the room. This unit cleans the air, removing the dust generated in blast room operations by filtration through cloth. This gets all of the dust.

The blast room has "down-draft" ventilation through a special ceiling and vent ducts in the side walls. The sturdy, dust-tight light fixtures are mounted fairly low for best illumination. The room is lined with 3/16" wear plates. It is a long-lived room, providing excellent working conditions.

Ask for the Sly Condensed Catalog describing our complete line of DUST CONTROL and SAND-BLAST EQUIPMENT.

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SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS • BLAST CLEANING EQUIPMENT

MAN-TO-MAN on the Molder's Bench

"The Howdy Rounds"

By RALPH L. LEE

I DON'T think anyone could meet my friend Mac without learning to like him, for he's one of those salts of the earth who seem to have been born with what it takes to get on common ground with everyone. In fact, every one of his boys I met had something nice to say about him.

In spite of this, I noticed as we went through his foundry that while he "Howdied" about everyone who looked our way and by their first names too, he managed somehow or other to keep right on going through the plant without stopping to chat with those he had "Howdied." In view of my constant preaching on the value of man-to-man conversations between boss and man and knowing the friendly sort of a duck Mac is, I couldn't get the drift of his conversational gun-shyness in the plant.

I was sure that Mac noticed my puzzlement, for we barely got back to his office when he said, "Doc, you've known me for quite some time now and know what a friendly sort of person I really am—God only knows there isn't one drop of high-hat blood in my veins. If I didn't fight against it, I never would get through this plant, for I would stop and chat with every Tom, Dick and Harry who showed the slightest inclination to chat with me." I agreed with Mac and said that was why the morning's trip had me so befuddled.

"Now look Doc," he went on, "I want your honest opinion of what I'm going to say to you. I have found from experience that if I stop on a hit and miss basis and talk to one individual here and another over there, others who see me do it and who have known me longer are likely to feel just a little bit hurt or neglected when I don't get around to talk to them. Some with whom I talked on a previous trip will wonder what they could have done to cause me to pass them up this time. Then again when some of our newer foremen who haven't learned to know me very well see me talking to one of their men, I know it's just human nature for them to wonder what we are talking about and whether it could possibly have anything to do with them.

"After one whale of a lot of thinking and cut and try, it just seemed to me Doc," he went on, "that since it's absolutely necessary for me to make my regular rounds through the plant and impossible for me to do it and at the same time stop and chat on an impartial basis with everyone in the place, then the getting-acquainted job I insist upon being done in the organization has got to be done by those who have time to do it and do it right. After all Doc," he concluded, "what the hell do we have an organization for if it isn't to get acquainted and to keep acquainted with every individual we need to carry on the operation."

* * *

After I told him that it was obvious he couldn't do everything himself, he finished up by saying that he had finally come to the conclusion that for the best interests of all he had to do what he expected everyone else to do —WORK THROUGH THE ORGANIZATION and on everything, even when it came to developing the kind of personal relations it takes to get out quality production on time and on a profitable basis.

When he asked me what I thought of all this, I'll have to admit that I've never been up against a harder question. Up to this time it had never occurred to me that there could possibly be a situation in which a manager could do anything else but seize upon every opportunity for developing his employe contacts into mutually beneficial personal relations.

After humming and hawing I said, "Mac, you certainly have me up a tree. On one hand I know for a fact that one of the greatest complaints of the rank and file factory operator is being ignored by brass-hats. On the other hand, another gripe just as popular is that you can't get any place unless you're a relative of the powers that be or willing to polish the old apple. Mac," I continued, "it seems to me that you have uncovered another one of these damnable between the devil and the deep blue sea situations but I see no other way out than the one you have chosen."

* * *

Now that I have had time to think over my visit with Mac, I'm not nearly so much impressed as I used to be with managers who seem to feel that the percentage of their employees they can call by first or nickname is an important measure of good employee relations in their plants. It strikes me now that such managers might easily overestimate the value with which their employees hold a "Hi Saml" from the top brass-hat. In any event, I now feel pretty sure that a manager's memory for employees' names and a knowledge of the number of kids and hobbies of the relatively few employees the top boss has time to cultivate is not a substitute for planning and executing an organization-wide effort for building effective employee relations.

Even at a sacrifice of his own personal acquaintance with individuals among the rank and file, he might better be more concerned with the personal relationships which exist between each individual employee and his respective foreman, between that foreman and his own personal superintendent and lastly and far more importantly, the wholesome personal relationship which exists betwen the superintendents and himself.

Aside from all this, I still believe that with the little time he has left over from keeping his outfit right side up and headed on a course, he couldn't spend it more profitably than by learning to know the names and the interests of as many of his employees as he possibly can and to use this information on his regular "Howdy" rounds through his plant.

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Radiography shows the way to quality and low cost

IF YOU MAKE large or small parts or a product whose reputation depends upon internal soundness for quality and satisfactory service, radiography can help you establish and maintain dependable quality and effective control. If you do expensive machining . . . expensive because of duration or complexity of operation . . . machining which might be lost when internal irregularities are revealed . . . you will find that radiography more than pays for itself.

That's because radiography can show and record the internal condition of parts or components without destroying them or slowing up your production line or disrupting your shop procedure.

Add up these advantages in terms of customer satisfaction . . . improved designs . . . eliminated waste . . . predictable production . . . and you will see how reasonable in cost x-ray operations are.

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Around DETROIT

By A. H. ALLEN
Detroit Editor, The Foundry

General Motors adopts unusual method in determining most suitable site in Ohio for new gray iron foundry to be operated by its recently organized Central Foundry Division

THESE days the decision on where to locate a new plant is contingent upon many factors other than supply. Hence considerable interest attaches to a novel technique instituted last month by General Motors in the effort to determine where to locate a large new gray iron foundry to be operated by the corporation's recently organized Central Foundry Division.

First step was to take options on alternate plant sites in two cities—Defiance and Tiffin, O., which were considered suitable from a geographical standpoint. Next step was to sound out the communities to determine which area could best supply from among its residents the 2000 needed to staff the proposed foundry. This was done by newspaper advertisements in Defiance and Tiffin, reproduced herewith. Headquarters were established in each city, where company representatives were on hand for a week to interview interested job-seekers.

Decide by Popular Vote

S. W. Healy, general manager of the Central Foundry Division, and formerly works manager at the Saginaw Malleable Iron Division, explains it this way, "A preliminary survey made by us indicates both Defiance and Tiffin are ideally located geographically for this new plant. Each has the necessary power, water, transportation and other facilities to handle a plant of this size. However, it has been impossible for us to determine accurately whether either area has a large enough available supply of workers to operate the plant. We will need about 2000 employes. Frankly we do not know whether either area can supply that number of workers; we have, therefore, decided to take the simplest course open to us and ask the people of these areas themselves this one question: 'How many people would be available and would make application to work in a new General Motors plant in this area?'

"The answers we receive to this question will determine whether the plant will be located in Tiffin or Defiance. I also want to make it clear at this time that, if we are unable to recruit from either of these communities a working force sufficient to operate the proposed foundry, we will have no alternative but to drop the options at both locations and seek a site elsewhere."

(The latter statement should have been a strong enough threat to stimulate the respective chambers of commerce in the Ohio cities to a burst of activity, although it is still too early to learn the results of the campaign).

A word about the new Central Foundry Division. It was announced late in July and headquarters established in the foundry operated by Harrison Radiator Division in Lockport, N. Y. This unit is comparatively small, operating two cupolas of 4 tons per hour capacity. Principal product has been gray iron radiator fittings for passenger cars and trucks, but during the war seven crucible furnaces were installed for melting brass and aluminum. Now radiator fittings have been redesigned in pressed steel and there is no longer need for the gray iron capacity, so the facilities were taken over by the new division and are now producing a quantity of shock absorber castings for shipment to the Allison Division for machining. These units normally are produced by Delco but additional capacity was needed, so Allison entered the picture.

Plan Large New Foundry

Meanwhile, plans for an elaborately modern new gray iron foundry have been taking shape under direction of Healy and R. H. Mooney, also formerly with Saginaw Malleable, with the assistance of engineers in the GM central office. The structure is described as being of advanced design and incorporating the most modern developments in ventilation and material handling, practically all movement of molds, materials and iron to be accomplished by mechanical means. Products will include a diversified range of gray iron castings for many GM divisions which are not able to place their requirements on the outside. Most of the work will be short-run orders, and in a sense the plant will be a large jobbing shop. Present plans call for its completion by next April, or in about eight months.

Of the proposed working force of 2000, 800 will be needed for molding, sand testing, melting and pouring operations; 700 for producing, assembling and gaging cores; and 500 for cleaning, grinding and inspection work. About 500 of the available jobs are suitable for women. At first glance it appears as though residents of the two areas might be a little reticent about applying for foundry work, because the territory is not predominantly industrial, and the general public labors under many misconceptions about foundries, thanks to government agencies' propaganda and rantings of unions.

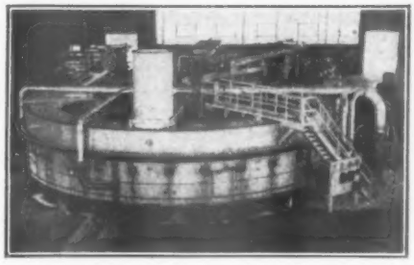
In Defiance there is one small gray iron shop operated by Defiance Machine

(*Concluded on page* 120)

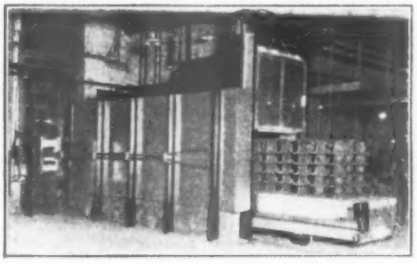
Society Note

Lee's Foundry Frolics of 1946 were held Aug. 9 on the property of the enlarged and modernized Lee Foundries. Birmingham, Mich., Ralph L. Lee (see p. 116), prop. Guests included Mesdames and Messrs. B. D. Kunkle, L. A. Danse, J. E. Linabury, Omer L. Allen and D. C. Amburn, the gentlemen all being closely associated with foundry activities of an automobile company known as General Motors Corp.

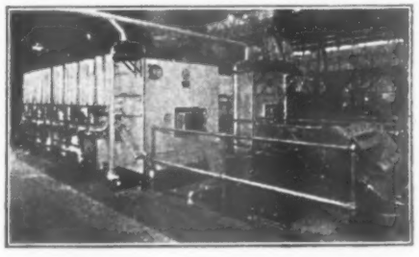
Following a tour of inspection of the refurbished foundry, iron puddlers' stew, prepared outdoors in a locally produced cast iron cauldron, was served to the guests seated in the spotless foundry. The program included casting of a demonstration heat by the proprietor, with souvenir skillets suitably embossed in the Lee-cast trademark presented to the visitors. The evening was concluded by showing of a motion picture starring Proprietor Lee and an associate, H. G. Weaver, also connected with the motor company. No casualties.



Heats 35,000 lbs. Billets Per Hr. Billets up to 10″ x 32″ are uniformly heated in this large EF oil fired rotary hearth furnace. Has hydraulically operated charging and discharge mechanism. Other EF rotaries available for various processes; in sizes ranging from 250 lbs. per hr. up. Write The Electric Furnace Co., Salem, Ohio, regarding your requirements.

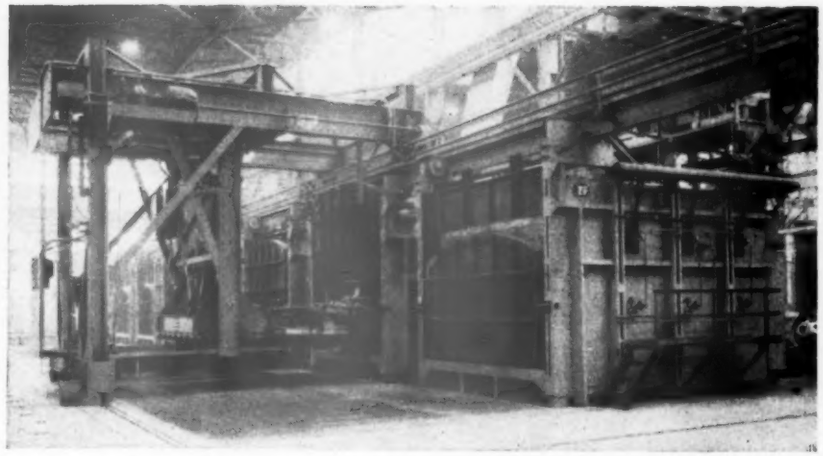


Car Type Furnaces. For annealing castings, bar stock plates; stress relieving welded structures; heat treating armor plate, etc. The above furnace is annealing steel castings. We build them either electric or fuel fired in sizes to handle any size product or for any size charge. The Electric Furnace Co., Salem, Ohio.



Scale Free Heat Treating Small Parts. 175 to 2000 lbs. of small and medium size parts and products, per hour, are scale-free hardened in EF continuous chain belt furnaces such as shown above. We build them either electrically heated or fuel fired. Send for data on sizes to handle your production. The Electric Furnace Co., Salem, Ohio.

Copper Brazing Heavy Assemblies.
EF roller hearth furnace copper brazing heavy steel assemblies. Other types are handling aluminum, brass, and steel assemblies ranging from small radio tube parts up to large automotive and aircraft units. Information on furnaces and brazing process available from The Electric Furnace Co., Salem, Ohio.



An installation of EF gas fired furnaces with quench and gantry crane for various annealing and heat treating cycles on large castings.

For
Production Furnaces
For Handling Castings
or other products in
Any Size or Shape

FURNACES OIL, GAS or ELECTRIC
For Every Heating and Heat Treating Process

Aluminum Brazing
Annealing
Billet Heating
Bright Annealing
Bright Hardening
Copper Brazing
Controlled Atmosphere
Carburizing
Drawing
Enameling
Forging
Hardening
Malleablizing
Silver Soldering
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Normalizing
Soaking Pits
Scale-Free Hardening
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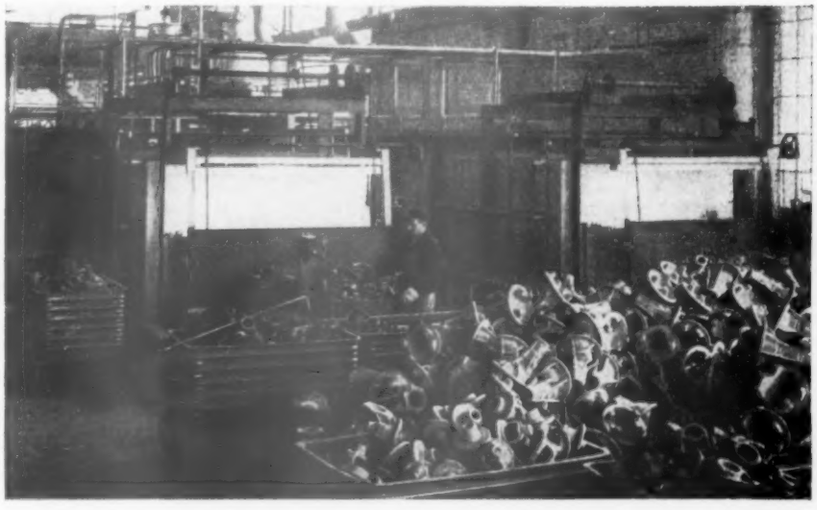
We Build the Furnace to Fit Your Job
THE ELECTRIC FURNACE CO.
SALEM, OHIO

ELECTRIC FURNACES FUEL FIRED

Scale-free, uniformly annealed castings are discharged continuously from the EF special atmosphere furnaces shown below.

For Production Furnaces, For Any Process or Production, Consult
The Electric Furnace Co., Salem, Ohio
No Job Is Too Large or Too Unusual



(*Concluded from page 118*)

Works, a subsidiary of Toledo Scale Co. In Tiffin the Webster Mfg. Co. operates one 10-ton cupola, and a 10-ton air furnace on malleable; and the Tiffin Foundry operates a single 6-ton cupola. Loomis Machine Co. also is a gray iron producer, and there are a couple of brass foundries in the city. Near neighboring Bettsville is the new Zoller Casting Co., a gray iron foundry. Defiance and Tiffin are about 65 miles apart and each is about 40 miles from Toledo; Defiance southwest on the Maumee river, Tiffin southeast on the Sandusky river. General Motors is building new plants at Cleveland, Elyria and Sandusky, O., not foundries, however.

While exact details of the new Ohio foundry have not been disclosed, a force of engineers has been working on it for some time in Detroit. One report current is that consideration is being given to a type of steel and glass wall which can be raised completely in warm weather, giving the effect of open-air operations except for the roof. Some equipment programs have been discussed, but buying as of early August was not active. Headquarters of the new Central Foundry Division eventually will be moved from Lockport and Detroit to the Ohio plant. The division comes under the direction of R. K. Evans, vice president in charge of the general engines group of the corporation.

* * *

SHORTAGE of pig iron is forcing foundrymen to take drastic steps to keep operations moving. An unusual incident is related with respect to Chevrolet Gray Iron at Saginaw, where an expected shipment of pig was delayed and cupolas were in danger of imminent shutdown. Iron is brought into this plant by boat, and someone recalled that a good many years ago a large quantity of pig iron stored at the dock slid into the river following collapse of a portion of the dock. So an electromagnet was rigged up and exploratory operations started on the river bottom. Result was that finally about 70 tons of pig was hauled up from the muck, and this was sufficient to tide over operations until the late shipment arrived. A car and a half of iron is not much for a plant of this size, but anything will do in an emergency. The Saginaw unit has even purchased 300 tons of iron from a Mexican blast furnace, through U. S. suppliers, and hopes this material may prove satisfactory to make up for some of the current drouth.

Other automotive foundries likewise have gone far afield for iron, making buys from Geneva in Utah and from the Kaiser furnace in Fontana, Calif. CPA diversion of iron to soil pipe manufacturers, farm implement builders, etc., plus the establishment of preference ratings on iron castings, are only adding to the headaches now being experienced.

* * *

LAKEY Foundry & Machine Co. in Muskegon has just about completed its $875,000 expansion and modernization program undertaken after V-J Day to cut operating costs and enlarge capacity for handling a backlog of castings orders now estimated in excess of $6 million. The program includes installation of more than 7000 ft of power conveyors, new shakeout equipment, a ventilating system, shotblasting equipment and a large heat treating furnace. Cost of the improvements was divided between $350,000 of new capital and $525,000 charged against expense in the final quarter of the 1945 fiscal year and the first eight months of the current fiscal year.

* * *

APPOINTMENT of Harold T. Youngren as director of engineering at Ford has meant the reassignment of R. H. McCarroll from his post as executive engineer to director of chemical and metallurgical engineering and research. Youngren is an expert on automatic transmissions, at one time chief engineer of Oldsmobile and more recently in charge of engineering development for Borg-Warner Corp.

HELP WANTED!

To Determine How Many Workers Are Available to Staff a New

GENERAL MOTORS

Plant

GENERAL MOTORS is ready to build a brand-new and modern grey iron foundry to serve GM plants in Ohio, Indiana and Michigan.

It has options in both Defiance and Tiffin on suitable properties for a plant.

But before deciding the final location, General Motors must know whether there are enough men and women in either of these communities, or within reasonable driving distance of them, who will apply for work in the new plant.

Where the plant will be located will depend upon which area has enough available workers to man the operation.

Lack of housing and shortages of materials to build homes make it necessary to employ people now living in the area.

If neither area can provide enough people who will apply for work in the plant, General Motors will have to abandon both locations and look elsewhere.

So, we would like everyone in the communities in which this message appears to read the following facts carefully, then decide whether he would like to work for General Motors in a new plant.

APPLY IN PERSON in Tiffin

Beginning Saturday, August 10, and through Saturday, August 17, Central Foundry Division of General Motors will have a representative in Tiffin to interview applicants for jobs in the new plant.

Mr. J. D. Cunningham will be at the Frank B. Shire Motor Sales, 24-26 River St., every day, except Sunday, from 9 a.m. to 9 p.m. to register prospective applicants. Come in and see him. He will give you more details about the many and varied jobs the new plant will have. Your application will be recorded and you will be advised as to when work will be available—if the plant is located in this area.

JOBS FOR 2,000

The new foundry will require approximately 2,000 employes.

It will manufacture a wide and diversified range of grey iron castings for many GM divisions, thus lending itself to steady work.

There will be 800 people needed for molding, sand-testing, melting and pouring operations.

Another 700 workers will be required for producing, assembling and gauging cores.

And 500 more will be used for cleaning, grinding and inspection work.

Of these 2,000 jobs, about 500 will be suitable for women.

WORKERS WILL BE TRAINED

Skill or experience in foundry operations will not be needed to obtain employment.

Training on the job by experienced foundrymen will be provided to develop the necessary skills.

GOOD PAY—GOOD PLACE TO WORK

Wages in the new plant will be in line with General Motors' well-known policy.

The new foundry will be of advanced design, and the latest developments in ventilation and in material-handling equipment will be installed. Mold handling, iron pouring and many other operations will be done by mechanical means.

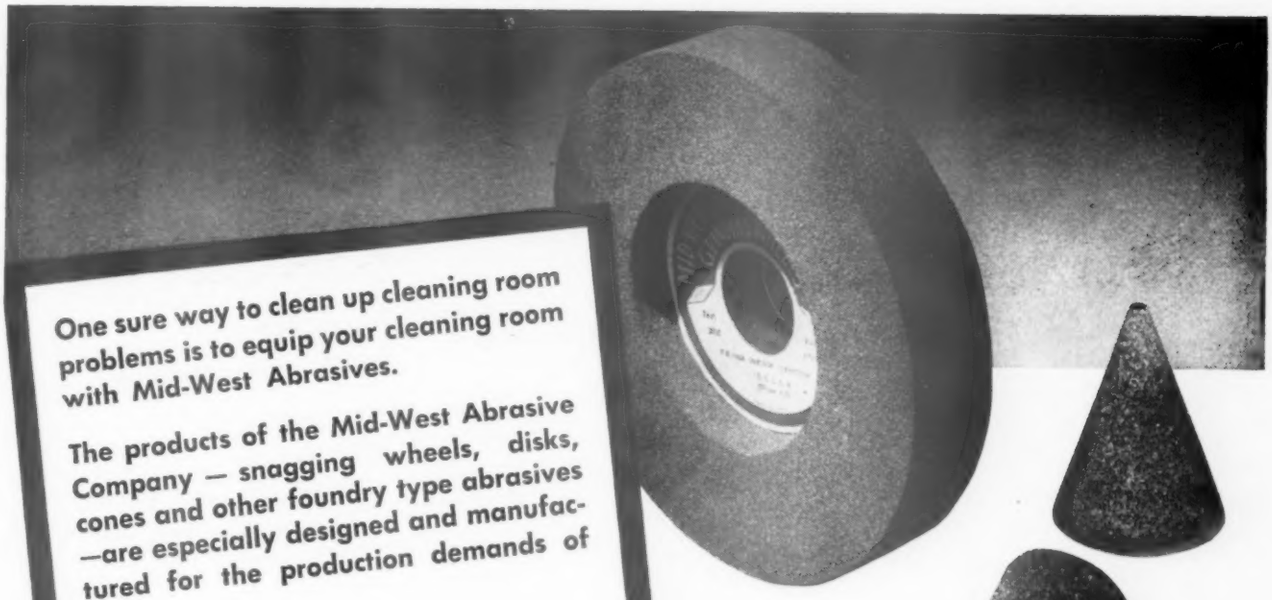
The foundry will be a clean, orderly plant, with all the devices and features that will make it a good place to work.

PLAN TO OPEN IN APRIL 1947

It is planned that the plant will be ready to begin operations early in April of 1947—only nine months from now.

CENTRAL FOUNDRY DIVISION
GENERAL MOTORS

To facilitate decision on whether to locate a new gray iron foundry in Defiance or Tiffin, O., the Central Foundry Division of General Motors Corp. published this advertisement in newspapers of both cities. Depending upon which city provided the greater response, decision to start construction will be made, options on land in both areas having been taken



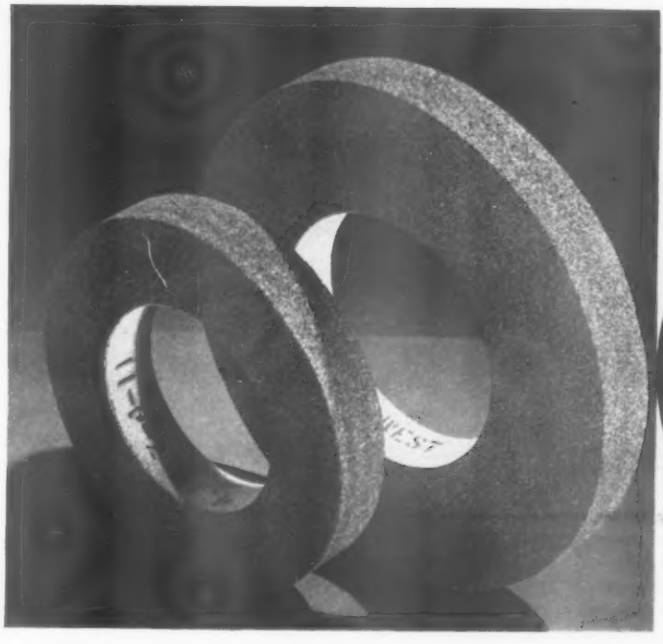
One sure way to clean up cleaning room problems is to equip your cleaning room with Mid-West Abrasives.

The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

Performance is the yardstick you use to measure the quality of the abrasive you buy. Apply that yardstick to Mid-West products, and you'll find your cleaning problems solved.

Switch to Mid-West today!

CLEAN UP WITH MID-WEST ABRASIVES



MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT

ROCHESTER, PA.

MALLEABLE FOUNDERS

Plan Committee Activities

MALLEABLE Founders' Society at its annual meeting in June elected the following board of directors: Cal C. Chambers Texas Foundries Inc., Lufkin, Texas; Ralph N. Cole, Canton Malleable Iron Co., Canton, O.; Alfred F. Crone, Acme Steel & Malleable Iron Works, Buffalo; D. R. Evans, Northern Malleable Iron Co., St. Paul; Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; H. M. Laws, New Haven Malleable Iron Co., New Haven, Conn.; Wilson H. Moriarty, National Malleable & Steel Castings Co., Cleveland; Frank S. O'Neil, Link-Belt Co., Indianapolis; Frank E. Shumann, Lehigh Foundries Inc., Easton, Pa.; K. M. Smith, Lancaster Malleables & Steel Corp., Lancaster, N. Y.; P. H. Vincent, Erie Malleable Iron Co., Erie, Pa., and Brinton Welser, Chain Belt Co., Milwaukee.

At the same meeting the directors elected the following officers, as was announced in the June issue of THE FOUNDRY: President, Frank E. Shumann; vice president, Wilson H. Moriarty; executive vice president, H. S. Colby and secretary-treasurer, John J. Harant, Cleveland.

Officers, directors and committee chairmen met at Hotel Cleveland on July 18 and 19, to organize committees and plan the society's activities for the coming year.

Research and product improvement work will be directed by Ralph N. Cole assisted by C. F. Lauenstein, Link-Belt Co., Indianapolis, as technical council chairman and by the society's consulting engineer, James H. Lansing. Regional shop practice meetings will be held during the year and studies made in connection with manufacturing practices. Quality control will be stressed.

Frank O. Parker, Dayton Malleable Iron Co., Dayton, O., heads the publicity committee and is in charge of producing *"Malleable Iron Facts,"* the society's bimonthly bulletin. George J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn., will direct the work in connection with the improvement of working conditions, maintenance of safety controls and employee and apprentice development. He will continue the work already done to correct the impression that today's foundries are undesirable places in which to work.

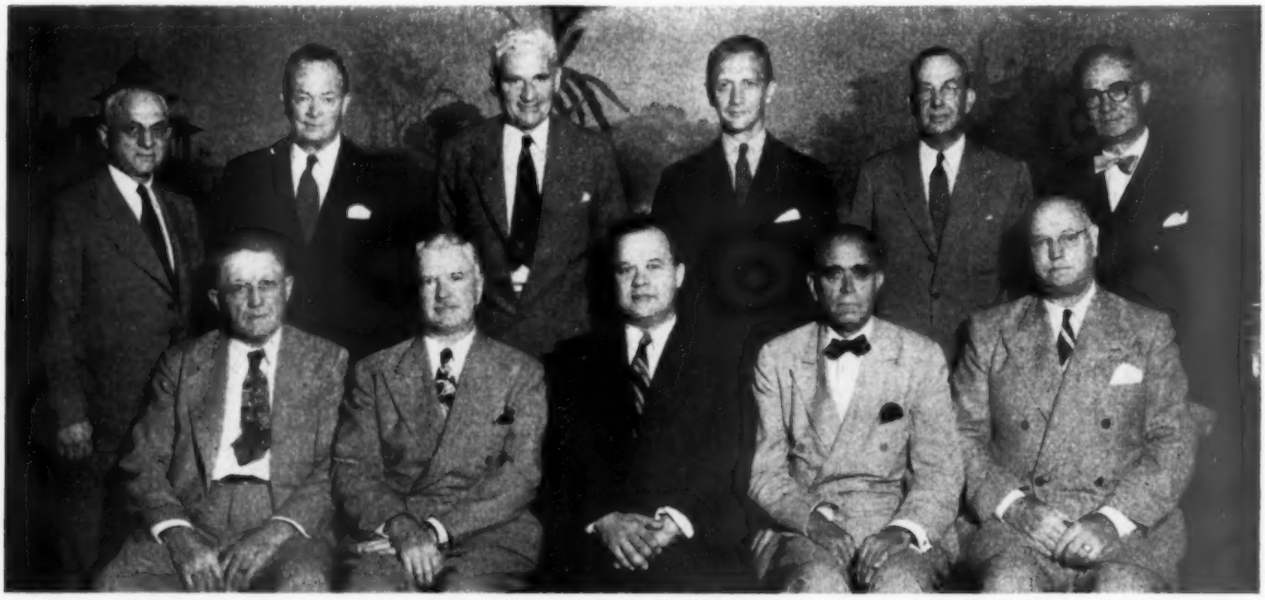
Work started on a cost manual to establish cost finding methods for all types of malleable foundry operations will be continued by John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill., cost accounting committee chairman. Col. Chambers will be in charge of the general meetings held for all members of the industry. During the intervening periods the usual monthly Eastern and Western sectional meetings will be held at which papers bearing on the work of the foundry industry will be presented.

Anthony Haswell will continue as education committee chairman. He has been active in the coordinating of activities of the entire ferrous foundry industry to the end that adequate study of foundry products be incorporated in curricula of important engineering schools of the country.

Brinton Welser, Chain Belt Co., Milwaukee, heads the government relations and controls committee; K. N. Smith is chairman of the membership committee and L. A. Dibble, Eastern Malleable Iron Co. Naugatuck, Conn., is finance committee chairman.

Issues Standard On Safety Apparel

Commercial Standard CS129-46, Materials for Safety Wearing Apparel, effective for new production from May 6, 1946, has been issued by Division of Trade Standards, National Bureau of Standards, Washington 25. The standard covers minimum quality requirements for material used in the manufacture of safety wearing apparel, and includes asbestos, cotton flame-resistant, leather, woolen fabrics and accessory materials as well as methods of test and labeling to certify or guarantee quality. Its purpose is to provide protection to the wearer of safety wearing apparel, serve as a basis for fair competition between manufacturers and supply a foundation for guaranteeing quality of materials.



Directors of the Malleable Founders' Society at a recent Cleveland meeting. Bottom row, left to right—Frank S. O'Neil, Link Belt Co.; Wilson H. Moriarty, National Malleable & Steel Castings Co.; Frank E. Shumann, Lehigh Foundries Inc.; K. M. Smith, Lancaster Malleables & Steel Corp.; Cal C. Chambers, Texas Foundries Inc. Upper row—D. R. Evans, Northern Malleable Iron Co.; Brinton Welser, Chain Belt Co.; P. H. Vincent, Erie Malleable Iron Co.; Anthony Haswell, Dayton Malleable Iron Co.; Ralph N. Cole, Canton Malleable Iron Co.; H. M. Laws, New Haven Malleable Iron Co.

Time-Tested

TUNGSTEN has made a sturdy growth.

Tempests have come and gone, leaving inevitable changes and destruction behind them. Substitute materials and new developments threatened to dislodge Tungsten as the standard alloying element in wide and varied fields of use; but it is now more surely established than ever.

One such field is that of high-speed steels in the manufacture of cutting tools.

In the realm of powder metallurgy, metal-cutting Tungsten carbides alone have come to represent an industry of impressive proportions.

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Integrated production and an adequate source of Tungsten products, both metallurgical and chemical, are offered by the Molybdenum Corporation. Technical advice is at the service of users. Specific information on Tungsten, Molybdenum, and other MCA alloying materials is available in printed form, on request.

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Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N.J.

Works: Washington, Pa.; York, Pa.

Mines: Questa, New Mexico; Yucca, Ariz.; Urad, Colorado.

MOLYBDENUM CORPORATION OF AMERICA

GRANT BUILDING PITTSBURGH, PA.

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The Right Type and Size for top production and lower costs.

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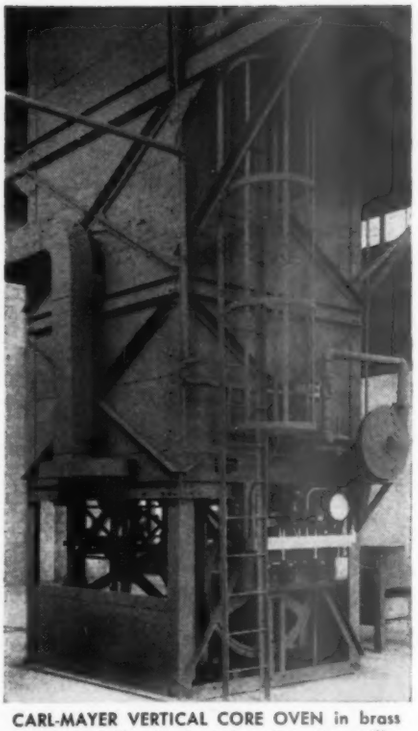
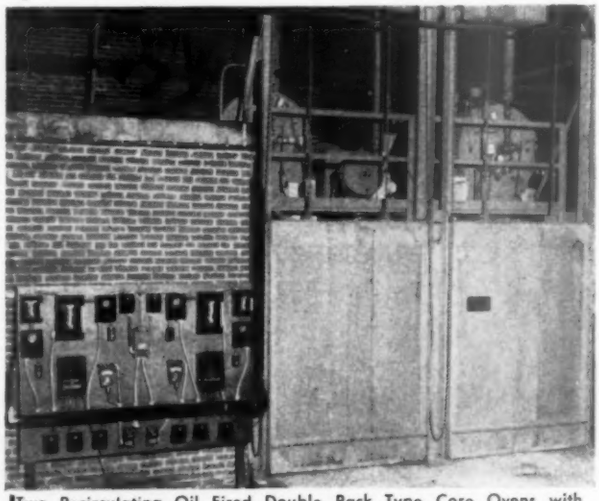
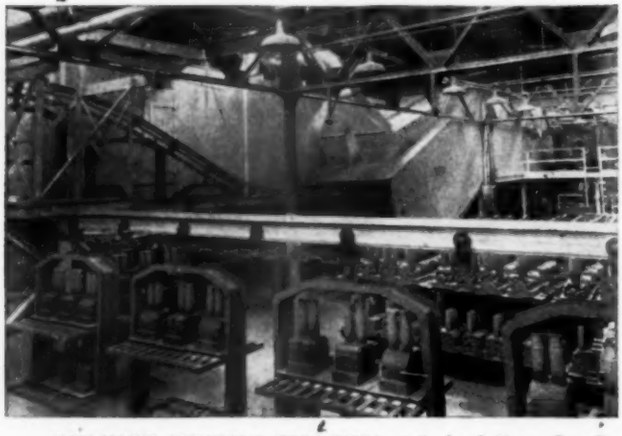


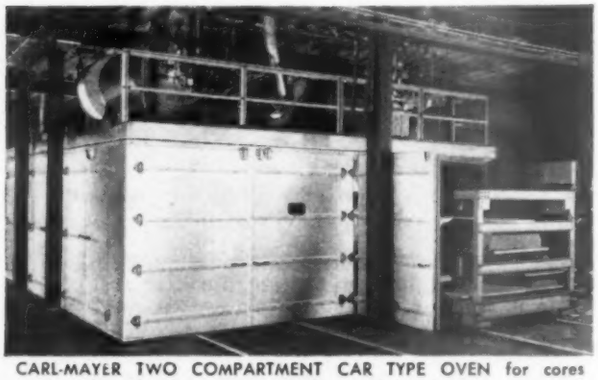
CARL-MAYER VERTICAL CORE OVEN in brass foundry of The H. B. Salter Co., Marysville, Ohio, manufacturers of heating and plumbing fixtures.



Two Recirculating Oil Fired Double Rack Type Core Ovens with Lift Doors, as installed for The Crucible Steel Castings Co., Lansdowne, Pa.



CARL-MAYER MONORAIL CORE OVEN at Packard Motor Car Co.



CARL-MAYER TWO COMPARTMENT CAR TYPE OVEN for cores and molds. Also has doors on side permitting its use as a rack type oven.

Malleable Founders' Society committee members at a recent meeting in Cleveland. Left to right, bottow row—John A. Wagner, Wagner Malleable Iron Co.; Brinton Welser, Chain Belt Co.; Frank E. Shumann, Lehigh Foundries Inc.; Ralph N. Cole, Canton Malleable Iron Co.; Frank O. Parker, Dayton Malleable Iron Co. Upper Row—John J. Harant, Malleable Founders' Society; George J. Behrendt, Eastern Malleable Iron Co.; James H. Lansing, Malleable Founders' Society; Cal C. Chambers, Texas Foundries Inc.; Anthony Haswell, Dayton Malleable Iron Co.; Robert E. Belt, Malleable Founders' Society.

TEST BARS FOR 85-5-5-5 Alloy

(*Continued from page* 89)

ing temperature and decreases with decreasing pouring temperature. The bar shown by this figure was poured at 2250 F from a melt of very poor quality, resulting in poor tensile properties which, in this case, were 34,400 psi with 29 per cent elongation. It is important to note that the coarse openness of the fracture within the white line is caused by the microporosity and not by any differences in grain size. In general, a very good correlation was obtained between the fracture appearance and the test-bar properties of Webbert-type bars.

Fig. 11 shows a longitudinal section in the plane of the web Webbert bar like the preceding figure, excepting that the melt was of high quality. The bar was poured at 2240 F. The microporosity is fine and rather rounded, resulting in higher ductility. The tensile properties are 35,800 psi with 42 per cent elongation. This figure, in comparison with the preceding one, shows a typical change in the amount, size, shape, and distribution of microporosity with decreasing gas content of the melt. Had the pouring temperature of these two bars been reduced, the amount of microporosity in both would have been correspondingly reduced until little or no unsoundness would have been visible at a pouring temperature near 2000 F.

In contrast to the Webbert-type bars, the cast-to-size bar, such as the L.T.B. shown by Fig. 12, is invariably columnar when poured from the high temperature, and this columnar appearance is visible on the fracture. As stated before, microporosity is not important in these cast-to-shape bars. Instead, if a melt is of poor quality, very small rounded pinholes are formed in the test bar, producing lower tensile properties in proportion to the amount of such pinholes present. This figure shows a typical unetched surface of an L.T.B. test bar poured from 2250 F employing a melt of high quality. The dark areas are tears produced as the test bar was broken. The very fine lead particles and the high degree of soundness are typical of this design poured from a melt of high quality. The tensile properties of 36,600 psi with 46 per cent elongation are also high. A melt of poor quality would produce a structure nearly identical to this, except that numerous small, rounded pinholes would be evident, especially on the cope half of this bar.

Thus, all other factors the same, with increasing gas content of the melt, the microporosity in Webbert-type bars and the rounded pinhole-type of porosity in cast-to-shape bars both increase with a resulting decrease in the tensile properties. Employing the same melt, these defects decrease with decreasing temperature, tending to produce higher tensile properties.

However, there is one other major factor affecting the tensile properties. This is the size, shape, and distribution of the lead particles. The next four figures illustrate this principle.

Fig. 13-A shows a microradiograph of a horizontal $\frac{5}{8}$-in. web Webbert bar poured from a melt of high quality at 2150 F into a natural green sand mold. Because this is a microradiograph, the porosity occurs as light areas and the lead as fine dark areas. The tensile properties obtained were 37,000 psi and 48 per cent elongation. The maximum porosity occurs in that portion of the test bar adjacent to the connecting web. The lead particles are moderately coarse and rounded, favoring good tensile properties.

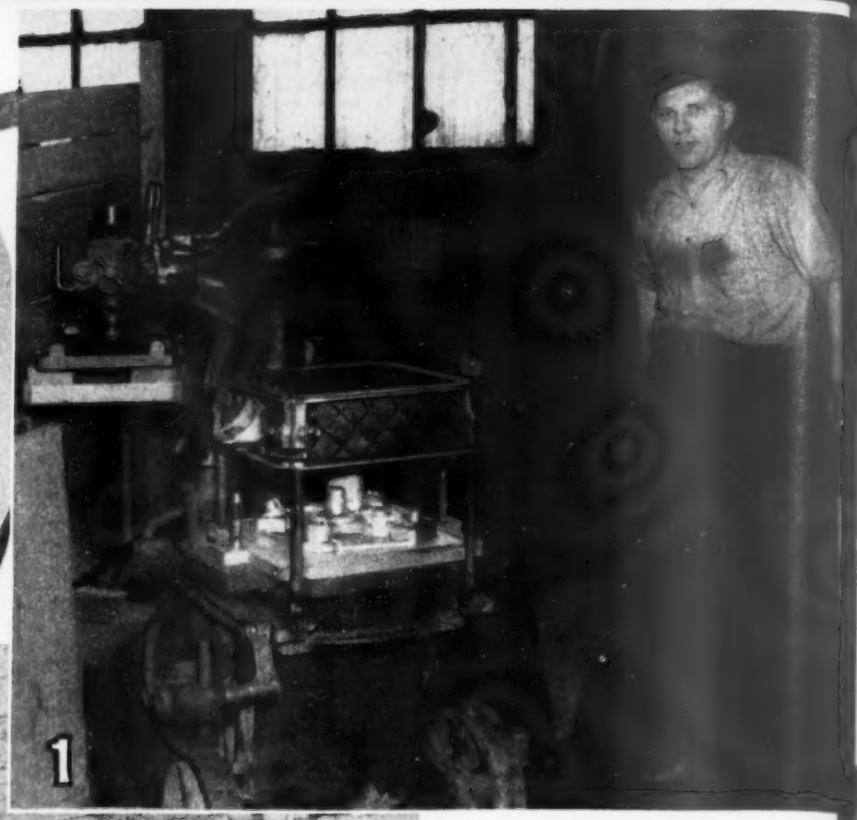
This is better illustrated by Fig. 13-B which shows a micrograph at X50 of the same specimen illustrated by the microradiograph. The moderately fine, rounded particles of lead are evident here at a point midway between the center and periphery of the bar in the plane of the connecting web. This, and the preceding figure should be compared with the two which follow.

Fig. 14-A shows a microradiograph which is entirely comparable to the preceding one, excepting that the melt was poured into a synthetic sand mold which had very adverse effects on the structure and test-bar properties obtained. The dark particles representing the rather coarse, angular lead, cause low properties, but they are better illustrated by Fig. 14-B. Again, this micrograph was taken at X50 midway between the center and

(*Concluded on page* 128)

INTERNATIONAL MOLDING MACHINES

Pictures Taken at
CHICAGO MALLEABLE CASTINGS CO.
Chicago


1

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Many special designs developed to meet individual purposes and conditions.

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Fig. 2—**Type PK-16** Jolt, Squeeze, Power Pin Lift Machine, for large work.

Fig. 3—**Type GS** Jolt Ram, Power Turnover, Power Draw Machine.

Fig. 4—**Type G** Jolt Ram, Power Turnover, Foot Draw Machine.

Fig. 5—**Type LJS** Jolt Squeezer.

Fig. 6—**Type PKL** Jolt, Squeeze, Power Pin Lift Machine, for small and medium work.

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FOUNDRYMEN!

Operate continuously at

MAXIMUM PRODUCTION

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INTERNATIONALS

6

(*Concluded from page* 125)

the periphery of the bar in the plane of the web. The coarse, angular lead particles are evident. These coarse lead particles account for the markedly lower tensile properties which were in this instance only 35,000 psi and 25 per cent elongation. There is considerable evidence that very fine lead particles also produce inferior properties. This accounts, in part, for the frequent low tensile properties of the L.T.B. test bar despite its high degree of soundness.

In addition to the fine, rounded pinhole porosity which occurs in cast-to-shape bars and which has a very adverse effect on the tensile properties, it has been noted that a low pouring temperature sometimes produces localized shrinkage in the L.T.B. cast-to-shape bar. When this occurs, very low tensile properties are obtained.

We may sum up the relationship of microstructure, fracture, test-bar properties, and pouring temperature as follows:

1. As the gas content of the melt in the pot increases, with all other factors the same, the quantity of microporosity in the Webbert-type test bars increases with a consequent lowering of tensile properties.

2. Presence of microporosity in the Webbert-type bars is evident by the occurrence of the open coppery appearance of the fracture. The greater the amount of microporosity in the test bars, the greater the area and the coarser the coppery or open portion of the fracture, making it possible to estimate the amount of microporosity by examination of the fracture.

3. In cast-to-shape bars, such as the L.T.B., increasing content of gas or gas formers in the melt produces an increasing amount of fine rounded gas porosity in the test bar which is not readily observed on the fracture but which, in general, causes a reduction in the tensile properties.

4. In addition to the amount of microporosity in Webbert bars or small rounded pinholes in cast-to-shape bars, other factors which determine the properties of the test bars apparently are the size, shape and distribution of the lead particles. In general, coarse rounded lead particles are the most favorable, while very fine particles or coarse angular particles generally have an adverse effect on the tensile properties.

5. Localized shrinkage also causes low properties in certain cast-to-shape designs, such as the L.T.B., when poured at a low temperature.

6. In general, unfavorable lead size, shape and distribution in all designs and the occurrence of localized shrinkage in the cast-to-shape designs become more pronounced as the pouring temperature is decreased. On the other hand, the microporosity in Webbert bars or rounded pinholes in cast-to-shape bars are forms of unsoundness which are caused by the gas content of the melt and which becomes more pronounced as the pouring temperature is increased.

7. The interrelation of these two effects of pouring temperature, as just outlined, appears to determine the over-all effect of pouring temperature on the test-bar properties.

(*To be concluded next month*)

50th ANNIVERSARY: Robins Conveyors Inc., Passaic, N. J., recently announced plans for construction of a new large manufacturing building as more than 1000 employees and guests met to celebrate the company's 50th anniversary. In addition to the breaking of ground for the new building by Thomas Robins, company founder and chairman, the gathering also was the occasion for the awarding of service pins to 159 employees who have been with the company for various periods ranging up to 40 years. Shown here are Thomas Robins (left) and Thomas Robins Jr., president

THE STABILITY OF IRON CARBIDE

(*Continued from page* 91)

the fewest cycles required for the occurrence of this phenomenon was four for one specimen and the greatest number was 12 for another. With most specimens the change occurred at from six to eight cycles.

Specimens were standard malleable test bars. While there naturally was some variation in the composition of the various heats from which they were taken, the importance does not justify the space required for a detailed listing. Average analysis for air furnace iron was 0.95 per cent Si, 0.110 per cent S, 0.120 per cent P, 0.35 per cent Mn, and 2.50 per cent C, while that for duplexed iron was 1.05 per cent Si, 0.150 per cent S, 0.110 per cent P, 0.40 per cent Mn, and 2.50 per cent C.

Whether the malleablizing was carried out in a carburizing or decurburizing atmosphere seemed to have no effect on the occurrence of the phenomenon, but ultimately more carbide was formed in the case of the carburizing atmosphere because of the greater concentration of carbon.

Fig. 1 shows the structure of a specimen processed in a strongly decarburizing atmosphere. Carbide appeared on the sixth cycle and persisted through the seventeenth. Study beyond this point was prevented by deterioration from oxidation.

Tend To Form Carbides

Incidentally, the behavior of specimens processed in a strongly decarburizing atmosphere indicated some inhomogeneities of material that were not otherwise apparent. For example, the metal close to the ends of a standard malleable test bar had less tendency to form carbides than the remainder of the bar. When processed in a carburizing atmosphere this was not so apparent, due, no doubt, to the excess of other factors tending to produce carbide.

Fig. 2 shows the structure of a specimen processed in commercial carburizing compound. An interesting point observed when processing in carburizing was that the carbide formation was not a gradual progressive advance from the surface to the center, but an abrupt change from a little carbide at the surface to a rather uniform carbide distribution throughout the entire cross section.

(*Concluded on page* 130)

We are well pleased with No. 172 Mexican Blacking

KENNEDY-VAN SAUN MFG. & ENG CORPORATION
DANVILLE, PENNSYLVANIA

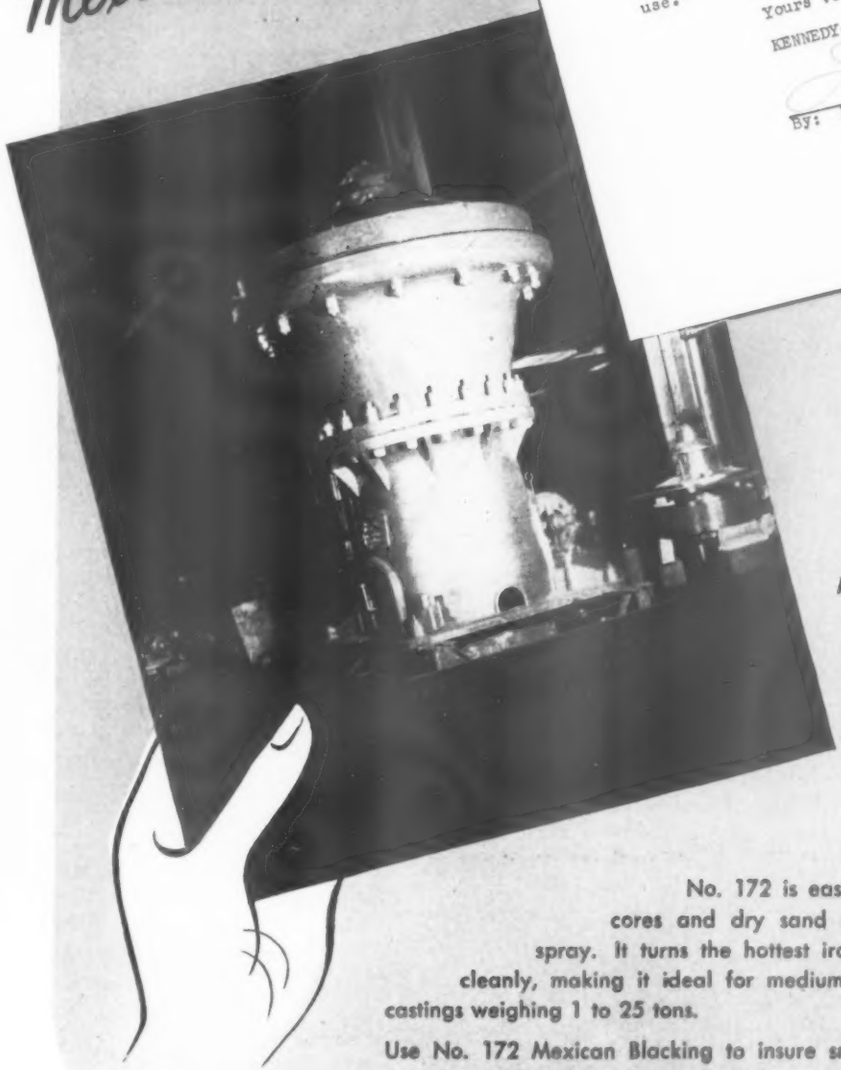
The United States Graphite Company
1621 Holland Ave.
Saginaw, Michigan

Gentlemen:

"The large castings -- the spider, and top and lower shells -- shown in the photograph of our No. 36 Kennedy Gyratory crusher were molded in our foundry using No. 172 Mexican Blacking. Note the resultant fine finish.

"We are very well pleased with the results obtained in using your product and we would be glad to recommend it to any other foundry for this particular application and use."

Yours very truly,
KENNEDY-VAN SAUN MFG. & ENG. CORP.
By: L. V. Murray, General Supt.



This excerpt of a letter from Mr. L. V. Murray, General Superintendent of the Kennedy-Van Saun Manufacturing and Engineering Corp., to The United States Graphite Company testifies to the excellence of No. 172 Mexican Blacking. A high quality wet blacking ready mixed with bond, No. 172 is easily and smoothly applied to cores and dry sand molds with swab, brush or spray. It turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons.

Use No. 172 Mexican Blacking to insure smoother, cleaner castings in your foundry. Write today for complete information.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

(*Concluded from page* 128)

Photomicrographs of specimens processed in carburizing compound quite a few times, say 10 to 30 cycles, appear as if enormous quantities of free carbon were present. This is not actually the case. The appearance is produced by a deteriorated structure which etches very fast. At this stage the combined carbon is practically all in the massive form. Carbon contents of a specimen processed in carburizing compound are given in the accompanying table.

Carbon Content of Specimen

Cycles	Total Carbon	Free Carbon	Combined Carbon
None	2.43	...	...
10	3.22	2.48	0.74
13	2.95	2.35	0.60
25	2.67	1.75	0.92
30	2.56	1.46	1.10

The carbide formed under these conditions is, if not stable, persistent to a degree far beyond that of the original carbide. Specimens loaded with carbide by processing in carburizing compound were then enclosed in small pipes, capped at both ends to minimize the influence of outside atmosphere, and subjected to additional malleablizing cycles in this manner. The persistence of the carbide is indicated in Fig. 3. Indications are that this carbide ultimately is destroyed by oxidation and not by graphitization.

An interesting phenomenon is observed when a specimen is first processed in a strongly decarburizing atmosphere until carbide appears in the center then switched to a carburizing atmosphere for further processing. Fig. 4. The carbide increases very noticeably in the center and carbide forms at the previously decarburized surface, but in the intermediate area, which had also largely decarburized, we find carbon nodules forming instead of carbide. It would appear the residue left from the original nodules (perhaps the original nuclei) retain their graphitizing influence. If the processing in carburizing compound is repeated a sufficient number of times, the whole cross section will be filled with carbide formations.

The phenomenon of carbide formation also occurs in gray iron, even soft, somewhat hypereutectic, irons when processed in a similar manner. They produce carbide sooner than the malleable mixture but can be processed only a few times before they are ruined by growth-produced cracks.

The effect of various elements as ladle additions to malleable mixtures was investigated in this connection. Cu, 0.50 per cent; Ti, 0.10 per cent; Si, 0.10 per cent; and Mo, 0.20 per cent all behaved very much as the untreated metal.

Tellurium, 0.10 per cent, graphitized completely on the first cycle in carburizing compound. (In a decarburizing atmosphere considerable pearlite was present.) The second cycle changed the structure to over half pearlite, the third cycle to practically all pearlite. The pearlite structure remained through the twentieth cycle, after which massive carbide began to appear.

Antimony, 0.05 per cent, was largely pearlitic from the first cycle and developed massive carbide on the eleventh.

Chromium, 0.20 per cent, had a pearlitic matrix with some small remnants of the original eutectic after the first cycle The eutectic remnants were removed on the second cycle, leaving the pearlitic structure which remained very much the same through the fifteenth cycle, after which massive carbide appeared.

Boron, 0.01 per cent, retained small particles of the eutectic through the first three cycles. Considerable massive carbide appeared on the sixth cycle and remained through further processing.

OBITUARY

WILLIAM J. Coane, 78, retired vice president and general sales manager, Ajax Metal Co., Philadelphia, died there July 31, following a long illness. Mr. Coane, active in foundry and metal industries for 60 years, was a native of Philadelphia, where he spent his entire life. He was engaged 5 years as salesman

WILLIAM J. COANE

and 21 years as sales manager in the Philadelphia territory of Joseph Dixon Crucible Co., Jersey City, N. J., and in 1912 became associated with Ajax Metal Co., serving as second vice president for 12 years, and first vice president and sales manager since 1924. At the time of the organization of the American Foundrymen's Association in Philadelphia in 1896, Mr. Coane was a member of the entertainment committee and has been an active member of the association since that time. He was named to honorary life membership in the AFA at the annual dinner of the association, held during the Golden Jubilee Foundry Congress and Foundry Show of that organization in Cleveland during the week of May 6.

• • •

Carl J. Zaiser, 67, president, Ampco Metal Inc., Milwaukee, died July 29, at his home in Wauwatosa, Wis., after being seriously ill for two months. Mr. Zaiser took over American Metal Products Co., later Ampco Metal Inc., in 1920. From a small bronze foundry it became one of the largest producers of special bronze alloys metals. When Mr. Zaiser retired as general manager in 1945, he retained the presidency of the company. His son, J. D. Zaiser, became executive vice president at that time.

• • •

Louis J. Desparois, 51, since 1936 St. Louis district sales manager, Pickands, Mather & Co., Cleveland, died recently in St. Louis. Mr. Desparois, prior to his association with Pickands, Mather was identified for two years with Hickman-Williams & Co., St. Louis. Previously he spent 8 years with St. Louis Coke & Gas Co., and 12 years with American Radiator Co. He was an active member of the St. Louis District Chapter of the AFA and served as chairman of the general committee in charge of arrangements for the national convention held by the association in 1943 at St. Louis.

• • •

Clarence C. Howat, 57, district sales manager, Continental Foundry & Machine Co., and a former vice president, Pittsburgh Steel Foundry, both of Pittsburgh, died July 22. Mr. Howat, a native of Pittsburgh, joined the Continental firm in 1936. During the recent war he served as a member of the Steel Castings Industry Advisory Committee, War Production Board.

• • •

Russell A. Cannon, vice president in charge of sales, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., until he retired a year and a half ago because of illness, died July 15, at his home in Wynnewood, Pa. Following his retirement Mr. Cannon served as consultant to the company's president.

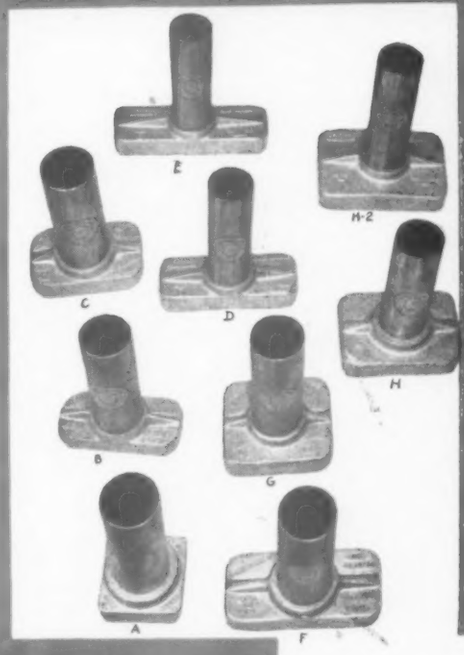
• • •

Samuel Turkus, 66, general manager, Federated Metals Division, American Smelting & Refining Co., Newark, N. J., died July 16, at his home in East Orange, N. J. Mr. Turkus had been connected with the smelting and refining industry for 50 years, and founded the Union

(*Concluded on page* 132)

THE IMPROVED Redford CORE BLOWER
CARTRIDGE BENCH TYPE

FOR EFFICIENT PRODUCTION OF SMALL, INTRICATE CORES



STANDARD SAND CARTRIDGES

The Standard Sand Cartridges are a cast aluminum base into which a seamless steel tubing (2⅝" or 2¾" Dia. x 8" long) is pressed. The bottom of the base is closed with an ⅛" cold rolled steel plate, in which holes are to be drilled to match the blowholes of the core box.

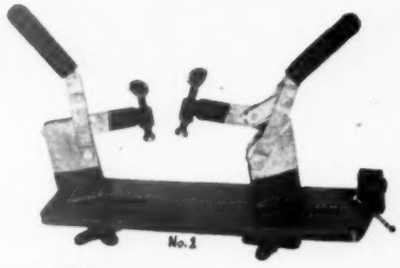
SIZES	WIDTH—LENGTH	PRICE
A	3½ x 3⅝	$10.00
B	2¼ x 5¾	11.00
C*	3 x 5⅜	11.00
D	2¼ x 7¼	12.00
E	2¾ x 8⅜	12.00
F	3 x 7¼	14.00
G	4½ x 5¼	14.00
H	4¼ x 8⅛	19.00
H2	4¼ x 7¼	15.00

To find outside dimensions, add ¾" to width and length of inside dimension.

Special size Sand Cartridges furnished upon application.

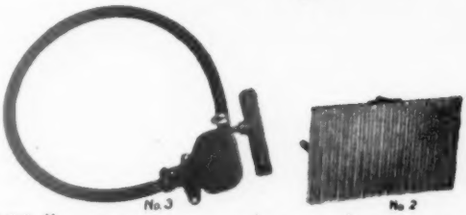
*This size adaptable to a large range of core boxes.

1. Core Box Clamping Attachment for blowing vertically split core boxes. (On end)



2. Core Box Drawing Attachment—used with No. 1 for drawing difficult cores.

3. Vibrator and Knee Valve—air or electric furnished with No. 2.



WHAT USERS SAY

Enclosed check $295.00, which we send with pleasure. We thank you for your interest and print on this core, which was blown perfectly as per your instructions. An additional order is placed for 550 more castings and we will consider the machine paid for.

We purchased a Redford cartridge bench core blower eight months ago and in that time we have saved its cost many times in labor savings.

An experienced core maker is not necessary to operate it efficiently.

It is adaptable to all small work and easy to set up.

The relatively small commission you will make from the sale of this core blower will never free you from the necessity of working like hell to make a living. However, if everything you sell gives the same service and satisfaction that this core blower is giving us, you will inevitably obtain such freedom, but soon.

Being so pleased with our Redford Cartridge Bench Core Blower, we feel that this information should be passed along to you.

The initial investment being so small, it was no time when the blower paid for itself. Production increased tremendously and because of the wide range even short runs are being blown.

*Names of these endorsers furnished upon request

PRODUCES SMALL, INTRICATE CORES WITH REMARKABLE SPEED AND SIMPLICITY

Quickly and economically installed. Does not require a large volume of air—½ c.f.m. is sufficient.

A ¾ inch air line with 80 to 120 lbs. pressure is ample to make cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

To blow core boxes of different height, shape or size, adjustments may be made instantly by the operator.

The Improved REDFORD Core Blower, Cartridge Bench Type, has an arm support column at the rear which provides an air reservoir to give additional volume of air per blow. Blow gun at base of column assures dry air at all times. All condensation in reservoir may be removed when using blow gun.

Sand Cartridges are made a part of the core box equipment. The base of a cartridge is determined by the blowholes in the box. However, one cartridge may be used for several core boxes of approximately the same size. The cylindrical part of the cartridge must be high enough from the base to hold sufficient sand to fill the core box once.

Write for Folder and "Seven Facts" regarding core blowing

REDFORD IRON & EQUIPMENT COMPANY

PHONE: REdford 8610

21315 WEST McNICHOLS ROAD — DETROIT 19, MICHIGAN

(Concluded from page 130)

Smelting & Refining Co., New York, in 1904. In 1917 he moved the plant to Newark, N. J., and in 1932 it was merged with American Smelting & Refining Co.

• • •

Richard N. Stillwell, 51 president and treasurer, Electric Wheel Co., Quincy, Ill., drowned in the Mississippi river near that city July 8 when his foot caught in the anchor line of his cabin cruiser and he was pulled overboard.

• • •

Harvey Cordingly, 72, former owner of the Queen City Brass Works, Denver, died July 7, at his home in that city. Mr. Cordingly, a native of Peoria, Ill., went to Denver in 1888.

• • •

R. Elliot Maxwell, 57, former vice president in charge of the export division of Whiting Corp., New York, died July 27 at his summer home in East Hampton, L. I. In 1944 he organized and headed his own export-import firm. Previous to 1941, when he joined Whiting Corp., he had been associated with Carnegie-Illinois Steel Corp. for 18 years.

• • •

William A. Gresens, 56, secretary-treasurer and a director, Robert W. Hunt Co., Chicago, died Aug. 4 in that city. He had been associated with the inspecting and consulting engineering company 35 years.

• • •

Robert B. Crawford, 45, vice president, Atlas Foundry Co., Detroit, and the eldest of the three sons of the founder of the company, died Aug. 12 in that city. A native of Glasgow, Scotland, Mr. Crawford attended Detroit schools and was graduated from University of Michigan in 1923, at which time he joined his father at Atlas Foundry Co. He was an active member of the Detroit Chapter of the American Foundrymen's Association, having served as its president in 1937-38.

Book Review

What Price Supervision, edited by R. D. Burdy, supervisor, vocational training, Board of Education, Cleveland; fabricoid; published by National Foremen's Institute Inc., Deep River, Conn. Price $2.

The author has had intimate contact over a period of years with industrial supervisors and executives which has afforded a continuing review of supervision, its problem, place and function, together with its compensations, limitations and possibilities. In undertaking to outline how management can build a stronger supervisory force, he puts the entire range of management under the scrutiny of objective analysis.

Divided into five chapters, the material presented relates to such phases as management-foremen relations, well balanced supervision, foremen training responsibility, effective types of inspection, operator co-operation, human values and supervisory worth.

Foundry Statistics

(Reported by Bureau of the Census)

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold	*Orders
1945				
Jan.	70,012	65,107	1,886	71,827
Feb.	61 698	56,992	1,713	72,736
Mar.	71,370	66 076	2 353	70,622
Apr.	76 366	71,105	2,390	71,103
May	76,122	70,748	2,453	76,792

* For sale only.

Gray Iron Castings

(Net ton)

	Shipments		Unfilled
	Total	For sale	*Orders
1945			
Jan.	861,524	536,499	1,921,572
Feb.	816 467	511,184	1,998,270
Mar.	927 925	587,380	2,089,046
Apr.	842 979	532,015	2 031,668
May	866 951	542 337	2,031,318
June	849 449	543,788	2,015,625
July	748 790	468,017	2,015,005
Aug.	750 050	462 364	1,817,801
Sept.	717,768	434,416	1,754,515
Oct.	767 209	461 720	1,741,981
Nov.	751,092	445,952	1,847,468
Dec.	678,091	397,529	1,877,095
1946			
Jan.	706 319	446,567	2,076,994
Feb.	541,177	368,384	2,152,766
Mar.	796 068	505,431	2,265,336
Apr.	856 678	529 323	2,378,348
May	757,041	454,194	2,491,811
June	735,060	435,866	2,633,118

* For sale only

Aluminum Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold	*Orders
1945				
Jan.	45 588	27,168	10,692	....
Feb.	44 091	26,674	9 814	....
Mar.	50 275	29,473	12,355	....
Apr.	46 320	27,090	11,185	....
May	43,323	24,398	10,977	....
June	39 074	21 050	10,254	....
July	31,130	15,573	8 859	....
Aug.	22,845	11,384	6,568	....
Sept.	15,805	7,313	5,325	....
Oct.	19,825	8,410	7,647	....
Nov.	18 961	8,137	7,305	....
Dec.	17,770	7,222	7,248	....
1946				
Jan.	23,568	9,556	10,131	83,541
Feb.	23,231	11,613	7,866	94,858
Mar.	26 661	10,792	11,305	97,013
Apr.	27,692	11,562	11 010	100 267
May	29,172	11,827	12,220	117,710

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments		Unfilled
	Total	For Sale	*Orders
1945			
Jan.	78,788	54,111	345,112
Feb.	75 220	51 089	341,558
Mar.	85,307	58,711	349,935
Apr.	76 065	51,011	346,421
May	79 565	52,789	328,471
June	71,992	47,510	285,210
July	55,813	35,439	284 017
Aug.	52,647	33,239	232,136
Sept.	46 960	28,506	219,905
Oct.	59 096	37,307	229,618
Nov.	57,315	36,007	227,309
Dec.	51,963	35,168	236,648
1946			
Jan.	53,685	38,181	245,878
Feb.	40,156	29,338	247,644
Mar.	50,235	33,978	263,227
Apr.	65 010	36 298	275 055
May	62,598	34,975	279,065
June	61,650	35,468	287,026

* For sale only.

Magnesium Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold*	Orders†
1945				
Jan.	10 424	6,149	4,028	....
Feb.	10 366	5 832	4,317	....
Mar.	12,646	6,703	5,677	....
Apr.	11 903	6 257	5,464	....
May	12,134	6,081	5,865	....
June	10,566	4 878	5 473	....
July	9,838	3,961	5,677	....
Aug.	4,960	1,820	3,036	....
Sept.	169	137	13	....
Oct.	251	216	13	....
Nov.	236	208	15	....
Dec.	261	230	14	....
1946				
Jan.	398	349	16	3,114
Feb.	438	366	35	3,338
Mar.	594	525	33	3,484
Apr.	570	465	36	3,297
May	661	587	45	3,778

* Includes incendiary bomb castings.
† For sale only.

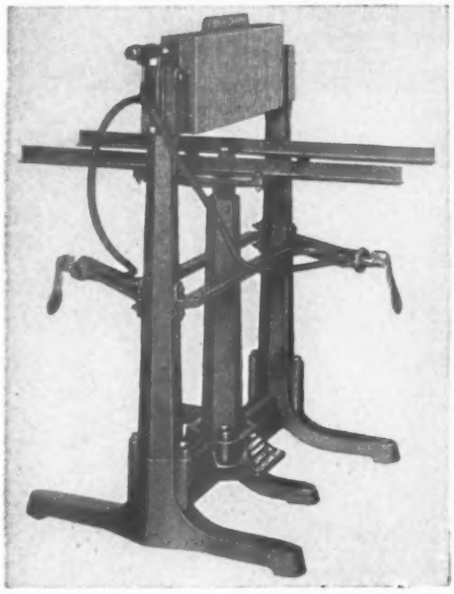
Steel Castings

(Net tons)

	Shipments		Unfilled
	Total	For Sale	Orders
1945			
Jan.	210,212	165,116	983,137
Feb.	191,361	152 082	1,045,374
Mar.	222 591	173 506	1,047,660
Apr.	197,737	154,883	1,018 930
May	192 921	149,623	852,877
June	173,685	129,193	776,265
July	139,315	102,428	728,397
Aug.	131,411	98,080	565,559
Sept.	114 613	83 751	513,758
Oct.	130,344	99,495	460,339
Nov.	123 048	91,409	443,773
Dec.	115,239	85,391	434,287
1946			
Jan.	99,058	77,071	*358,926
Feb.	57,423	45,151	390,077
Mar.	101 396	80 843	412,325
Apr.	146,327	108,586	392,790
May	129 211	94,630	381,654
June	123,551	91,715	361,293

*For sale only. Unfilled orders for 1945 include tonnage for sale and own use.

REAL "COST CUTTERS"



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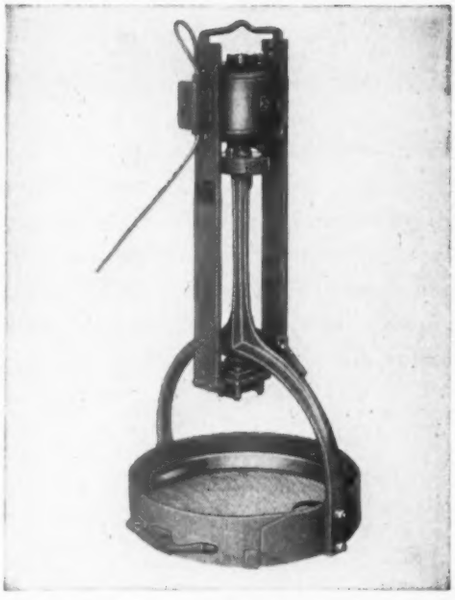

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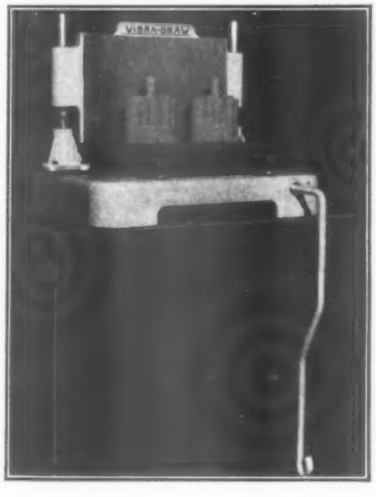

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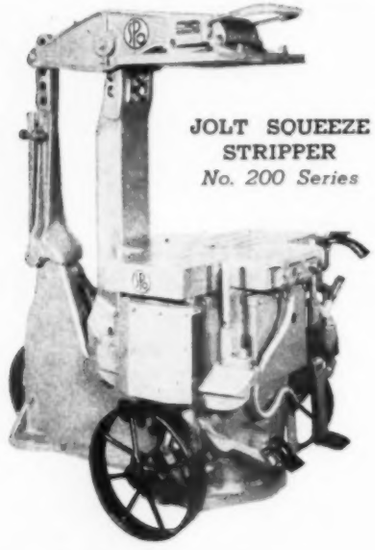

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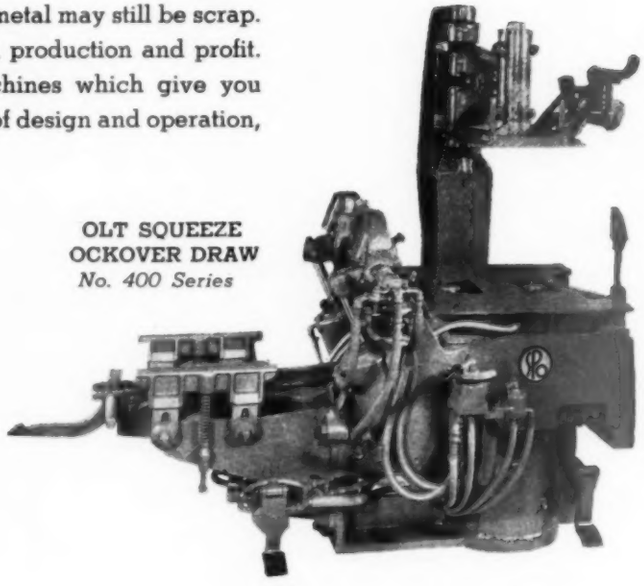
No. 200 Series



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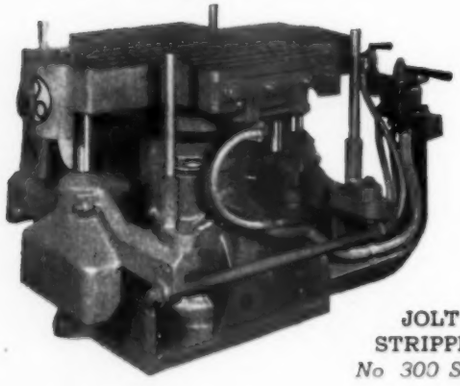
No. 400 Series



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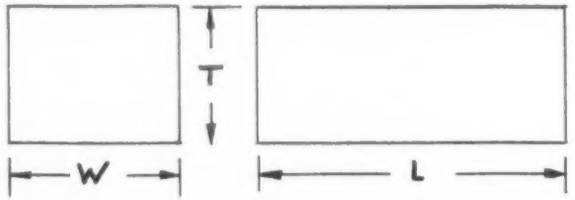
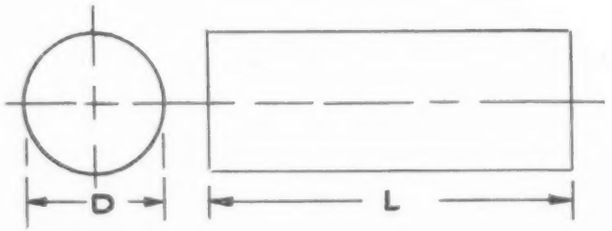
FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



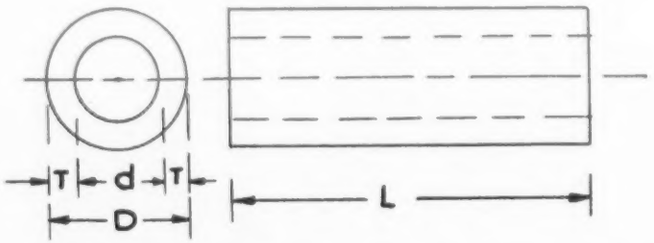
To find the weight of square or rectangular castings, multiply the length, by the width, by the thickness, by C (Table I).

$$W = L\ W\ T\ C$$



To find the weight of solid cylinders, the weight equals the outside diameter squared, multiplied by the length, multiplied by K (Table I).

$$W = D^2\ L\ K$$

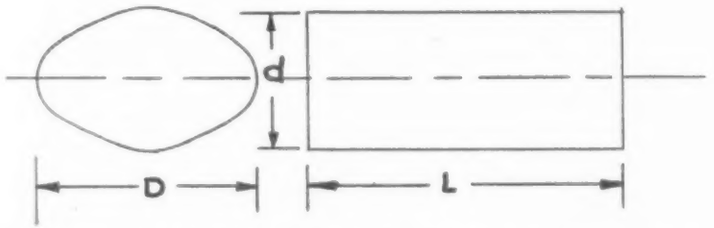


To find the weight of hollow cylinders, multiply the small or inside diameter plus the thickness, by the length, by the thickness, by M (Table I).

$$W = (d + T)\ T\ L\ M$$

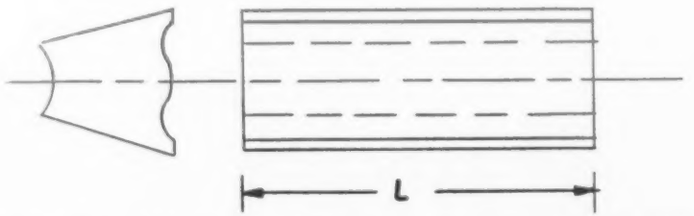
Table I

Material	C	K	M
Gray Iron	0.260	0.204	0.817
Malleable iron	0.264	0.207	0.829
Steel	0.284	0.223	0.892
Aluminum bronze	0.270	0.212	0.848
Aluminum-copper	0.103	0.081	0.327
Aluminum-silicon	0.096	0.075	0.302
Red brass, tin bronze	0.315	0.247	0.990
Leaded tin bronze	0.335	0.263	1.052
Yellow brass	0.305	0.239	0.958
Manganese bronze	0.288	0.226	0.905
Magnesium	0.065	0.051	0.204



To find the weight of a solid ellipse, multiply the large diameter by the small diameter, by the length, by K (Table I).

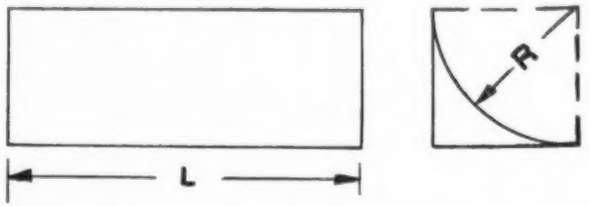
$$W = D\ d\ L\ K$$



To find the weight of a bar of irregular cross-section, multiply the area of the cross- section by the length, by the weight per cubic inch of material used (See C in Table I).

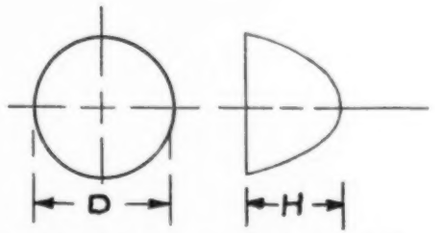
$$W = \text{Area} \times L \times \text{Wt. per cu. in.}$$

FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



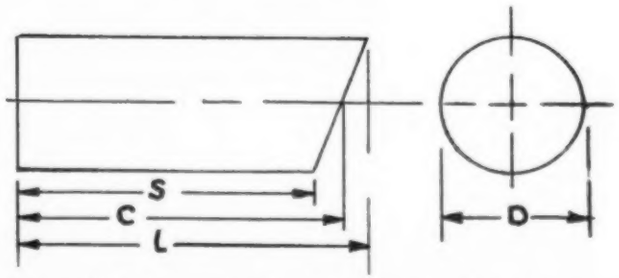
To find the weight of a straight fillet of any material, multiply the radius squared by the length, by the constant, K, corresponding to the weight per cubic inch as indicated in Table II.

$$W = R^2 L K$$



To find the weight of a paraboloid, multiply the diameter of the base squared by the height by the constant, m, whose value is indicated in Table III.

$$W = D^2 H m$$



To find the weight of a truncated circular cylinder, multiply the diameter squared by the distance on the center line from the base to the inclined section, by the value of k. C is equal to one-half of the sum of S and L.

$$W = D^2 C k$$

Table II

Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K
.096	.0206	.150	.0322	.210	.0451	.270	.0580	.330	.0708	.390	.0837	.450	.0966	.510	.1094
.100	.0215	.160	.0343	.220	.0472	.280	.0601	.340	.0730	.400	.0858	.460	.0987	.520	.1116
.110	.0236	.170	.0365	.230	.0494	.290	.0622	.350	.0751	.410	.0880	.470	.1009	.530	.1138
.120	.0258	.180	.0387	.240	.0515	.300	.0644	.360	.0773	.420	.0901	.480	.1030	.540	.1159
.130	.0279	.190	.0408	.250	.0536	.310	.0665	.370	.0794	.430	.0923	.490	.1052	.550	.1180
.140	.0300	.200	.0429	.260	.0558	.320	.0687	.380	.0815	.440	.0944	.500	.1073	.560	.1202

Interpolation Table

Addit'l weight	Addit'l value of K	Addit'l weight	Addit'l value of K	Addit'l weight	Addit'l value of K
.001	.0002	.004	.0009	.007	.0015
.002	.0004	.005	.0011	.008	.0017
.003	.0006	.006	.0013	.009	.0019

Method of Interpolation

If the weight, per cubic inch of material used, lies between two of the weights given above, use the interpolation table as follows:

Subtract the lowest of the two weights from that required; add the additional value of *K*, corresponding to this difference, called additional weight, to the value of *K*, for the least of two weights, between which the required weight lies.

Required *K* for material, which weighs .326 pound per cubic inch. This lies between .320 and .330. Subtracting the lowest (.320) from .326 we have .006 additional value of *K*, for .006 = .0013
value of *K*, for .320 = .0687

value of *K*, for .326 = .0800

Table III

Wt. per cu. in.	k	m	Wt. per cu. in.	k	m	Wt. per cu. in.	k	m	Wt. per cu. in.	k	m
.096	.0754	.0377	.210	.1649	.0825	.330	.2592	.1296	.450	.3534	.1767
.100	.0785	.0394	.220	.1728	.0864	.340	.2670	.1335	.460	.3613	.1806
.110	.0864	.0432	.230	.1806	.0903	.330	.2749	.1374	.470	.3691	.1846
.120	.0942	.0471	.240	.1885	.0942	.360	.2827	.1414	.480	.3770	.1885
.130	.1021	.0511	.250	.1964	.0982	.370	.2906	.1453	.490	.3848	.1924
.140	.1100	.0550	.260	.2042	.1021	.380	.2985	.1492	.500	.3927	.1964
.150	.1178	.0589	.270	.2120	.1060	.390	.3063	.1532	.510	.4006	.2003
.160	.1257	.0628	.280	.2199	.1100	.400	.3142	.1571	.520	.4084	.2042
.170	.1335	.0668	.290	.2278	.1139	.410	.3220	.1610	.530	.4162	.2081
.180	.1414	.0707	.300	.2356	.1178	.420	.3299	.1649	.540	.4241	.2120
.190	.1492	.0746	.310	.2435	.1217	.430	.3377	.1689	.550	.4320	.2160
.200	.1571	.0785	.320	2513	.1257	.440	.3456	.1728	.560	.4398	.2199

Interpolation Table

Ad'l. wt.	Ad'l. k	Ad'l. m	Ad'l. wt.	Ad'l. k	Ad'l. m	Ad'l. wt.	Ad'l. k	Ad'l. m
.001	.0008	.0004	.004	.0031	.0016	.007	.0055	.0027
.002	.0016	.0008	.005	.0039	.0020	.008	.0063	.0031
.003	.0024	.0012	.006	.0047	.0024	.009	.0071	.0035

For method of interpolation see Table II.

(To be continued)

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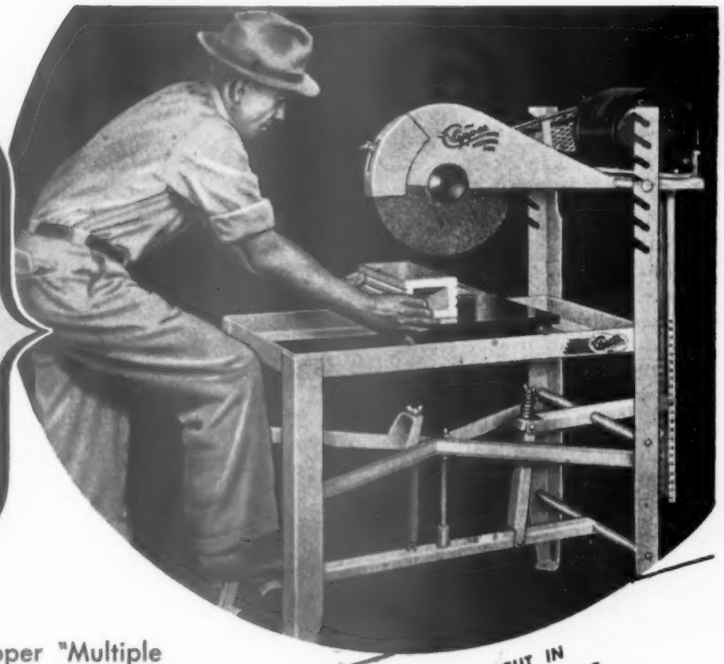
On Every Fire Brick Re-line Job . . . .



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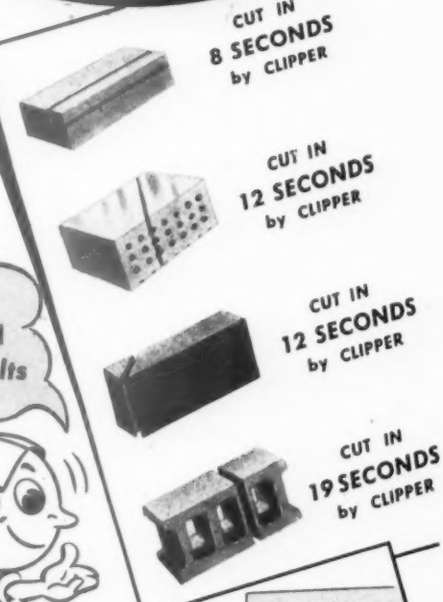

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AFA CHAPTER CHAIRMEN

Hold Conference in Chicago

MEMBERSHIP in the American Foundrymen's Association has more than doubled since 1941 and on June 30 was at a new high of 8539 companies and individuals, Sheldon V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis, 1945-46 membership committee chairman, revealed at the association's third annual chapter chairmen conference in Chicago recently. Mr. Wood is now president of the AFA.

The new membership peak represents a net gain of 727 members over last year and an increase of 1,919 since June 30, 1944. Foreign memberships, excluding Canadian, increased 92 per cent to 392 last year and personal memberships of all types exceeded the June 1945 total by 889, or 15 per cent.

Membership in the association's 32 chapters totaled 7767 on June 30 this year against 7110 last year. Two chapters —Chicago and Wisconsin—are in the "over 500 bracket" and five—Detroit, Metropolitan, Northeastern Ohio, Philadelphia and Southern California—have rosters of 300 to 500 members.

With the aim of better co-ordination of national organization and chapter activities, 36 newly elected chapter officers and AFA officials discussed program building, educational courses, apprentice work, vocational guidance efforts, cooperation with engineering schools and societies, AFA's technical, research and publishing programs, community relations and chapter operation highlights at the two-day Chicago conference.

William W. Maloney, AFA secretary, suggested that chapters plan for these five objectives: (1) an educational program conforming as closely as possible with the national program and local conditions; (2) a public relations program adequate to keep chapter activities before the area industry and the public; (3) sound, continuous membership growth, as a means of widening interest in the technical development of the industry; (4) meeting programs of consistently high quality and maximum industry value, and (5) closer co-operation with engineering societies and between chapters.

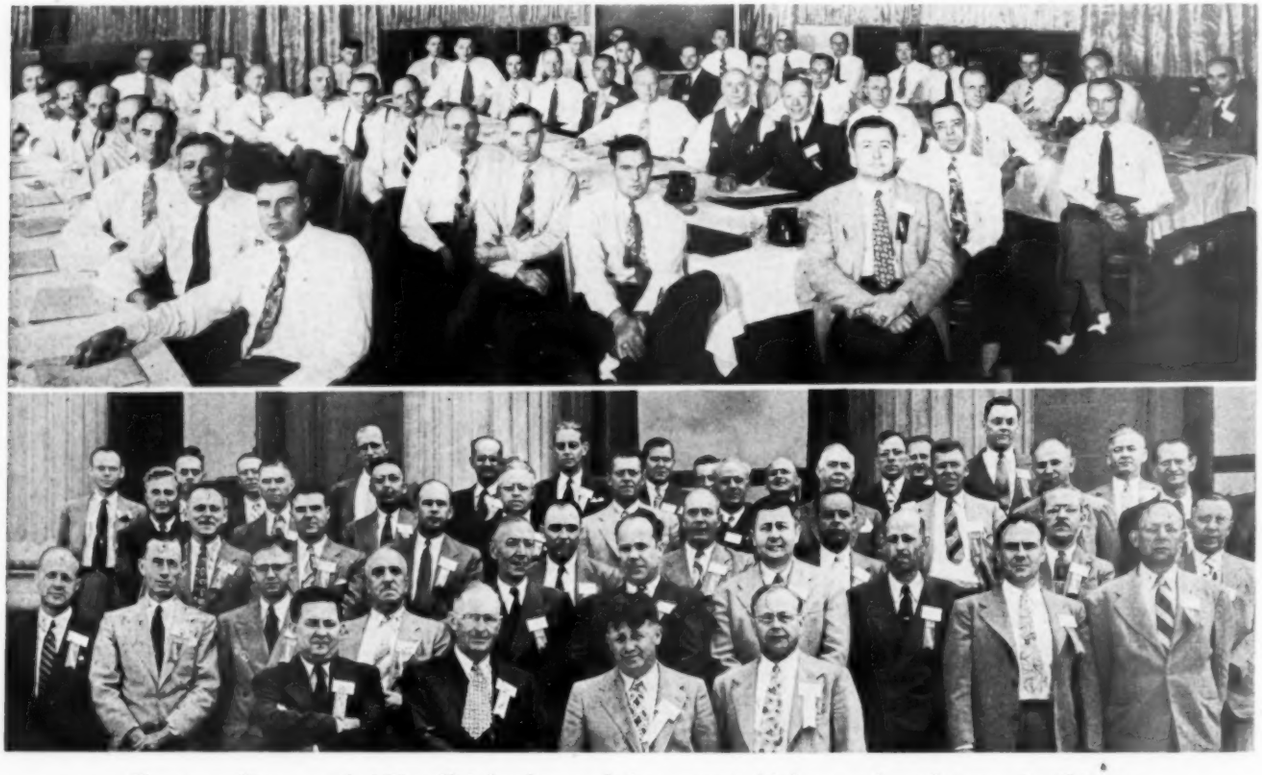
As steps toward furthering interest in the foundry as a work place, the conferees discussed formation of youth encouragement committees, closer cooperation with civic and vocational guidance groups and closer contacts with grade and high schools, apprentice contests, scholarships, plant visits for teachers and students, lectures and the betterment of foundry courses.

Dr. Henry T. Heald, Illinois Institute of Technology, Chicago, speaking on "Engineering Training and the Foundry Industry", declared that foundries must stimulate greater industry interest among college faculty members and students, if they are to meet their need for adequately trained engineers. The real opportunities of the foundry industry have been overlooked by students and teachers generally, he asserted.

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., AFA vice president, was chairman of the conference and Fred J. Walls, International Nickel Co., Inc., Detroit, immediate past president, welcomed the delegates and reviewed the 50-year history of AFA. Other AFA directors in attendance were E. W. Horlebein, Gibson & Kirk Co., Baltimore, and S. D. Russell, Phoenix Iron Works, Oakland, Calif., directors; and W. B. Wallis, Pittsburgh Lectromelt Furnace Corp., Pittsburgh.

Publishes New Trade Handbook

British Engineers Association, 32 Victoria street, Westminster, London SW 1, England, has published a 604-page handbook which contains a classified list of members and their manufactures. Members are listed alphabetically in one section with notations of the products made while in another the products are listed similiarly with designations of the maker.



Chapter officers and AFA officials shown during recent third annual conference in Chicago

A New
2800° COMBUSTION FURNACE
In the Low Price Field

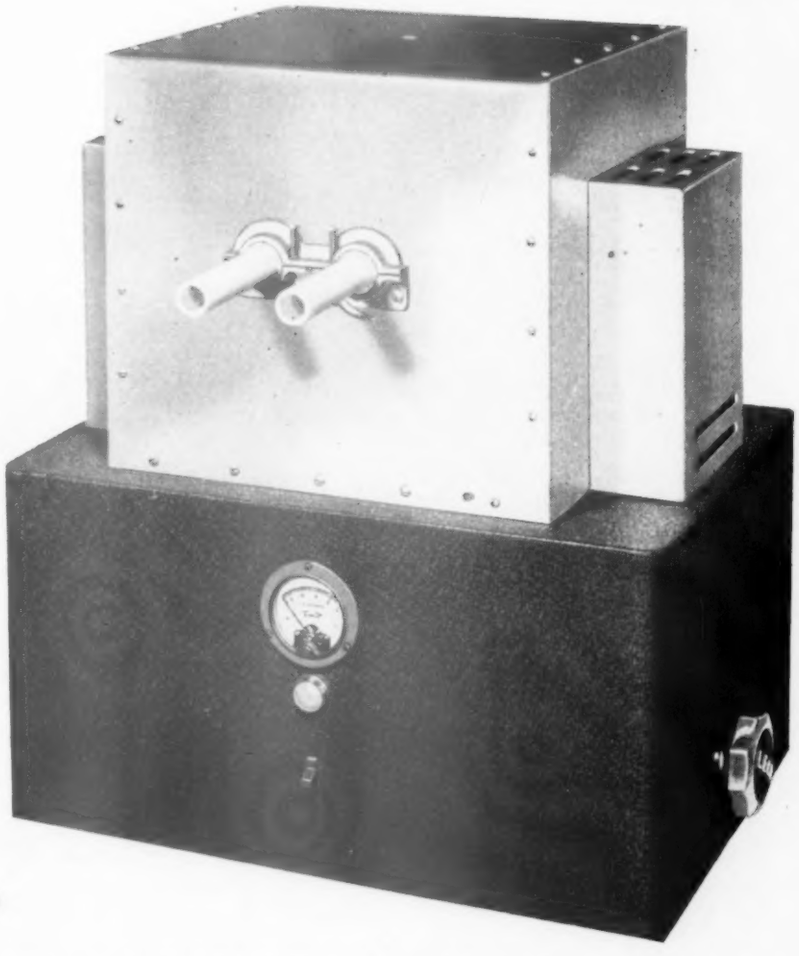
THE LECO No. 100 COMBUSTION FURNACE Will Outperform Any Competitive Furnace
A Comparison Is Invited

ABUNDANT CURRENT INPUT – FINEST INSULATION – SMALL HEAT LOSS = 2800° – GREAT ECONOMY – LONG LIFE

- **Its 3/4" Globar Heating Elements placed at right angles to the combustion tubes permits extra heavy insulation on *all sides*.**
- **The heavy aluminum shell eliminates excessive heat radiation.**
- **A large, well built, 2 KVA power unit, with 32 voltage steps, supplies abundant power.**
- **A magnetic breaker protects the furnace.**

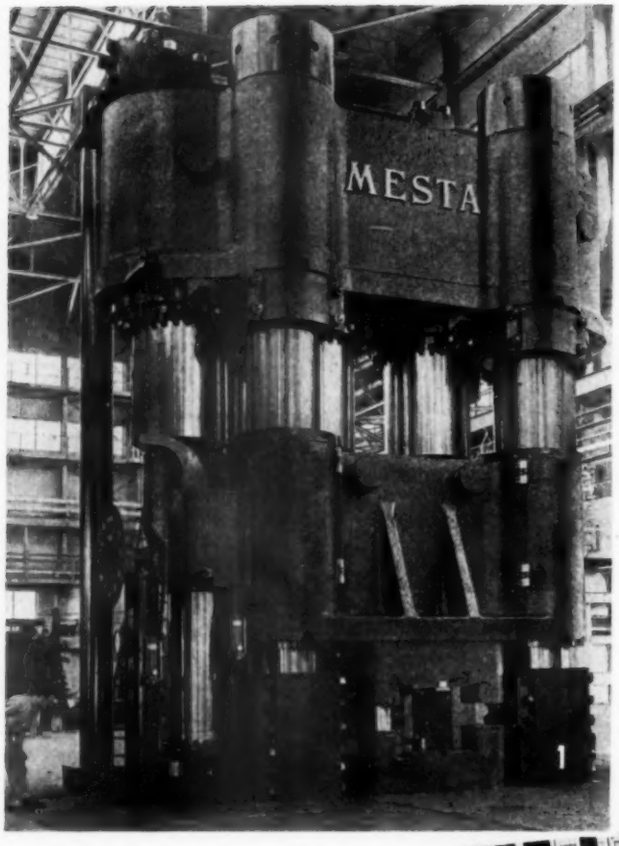
The Leco No. 100, in addition to its many uses, is an ideal combustion furnace for carbon analysis, especially where materials are difficult to combust, and where speed is desired. At 2550° continuous operation, its element life is extremely long. It accommodates a short combustion tube without excessively heating the ends. Special features permit rapid exchange of combustion tubes and heating elements. While built for efficient performance the straight lines of its sturdy contruction will add to appearance of any laboratory.

Leco No. 100 Combustion Furnace with Power Unit and Controls **$250.00**
Set of 3/4" Globar Elements (extra) . **$15.30**



LABORATORY EQUIPMENT CORPORATION
BENTON HARBOR, MICHIGAN

Large Castings Required for *Huge Forging Press*



UNUSUALLY large steel castings were required in building the 18,000-ton hydraulic die forging press installed recently in the new plant of Wyman-Gordon Products Corp., West Grafton, Mass., for the production of magnesium and aluminum alloy forgings. Said to be the largest of its type in the world the press was designed and built by Mesta Machine Co., Pittsburgh, and weighs complete—including motors, pumps, piping, etc.—2050 tons.

Principal castings in the unit are in the base, moving crosshead and stationary crosshead, each of which weighs in excess of 200 tons. Handling of these huge parts was no small problem and involved special routing of the railroad cars that hauled them from Pittsburgh to their destination.

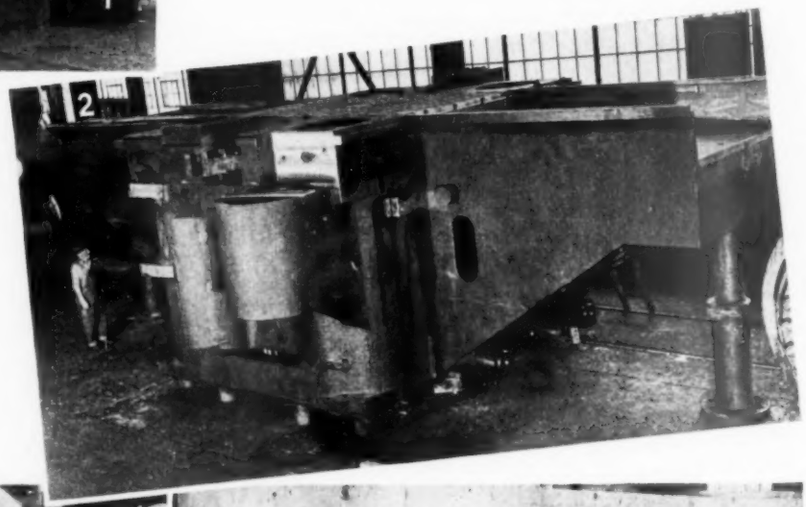
The accompanying views give some idea of the size of the castings involved. When assembled the press extends 15½ ft below the floor, and the height of the unit is 32 ft above the floor.

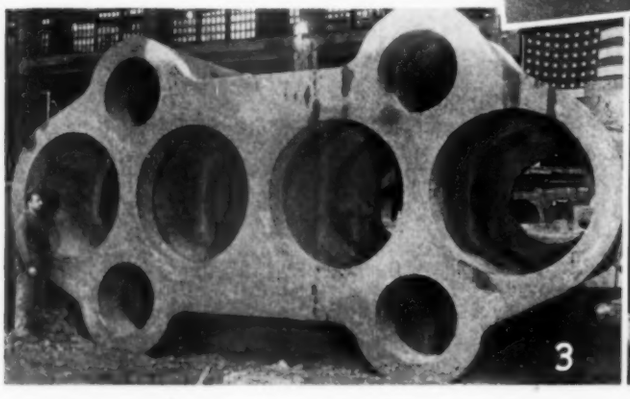
Fig. 1—Completed 18,000-ton press for forging aluminum and magnesium

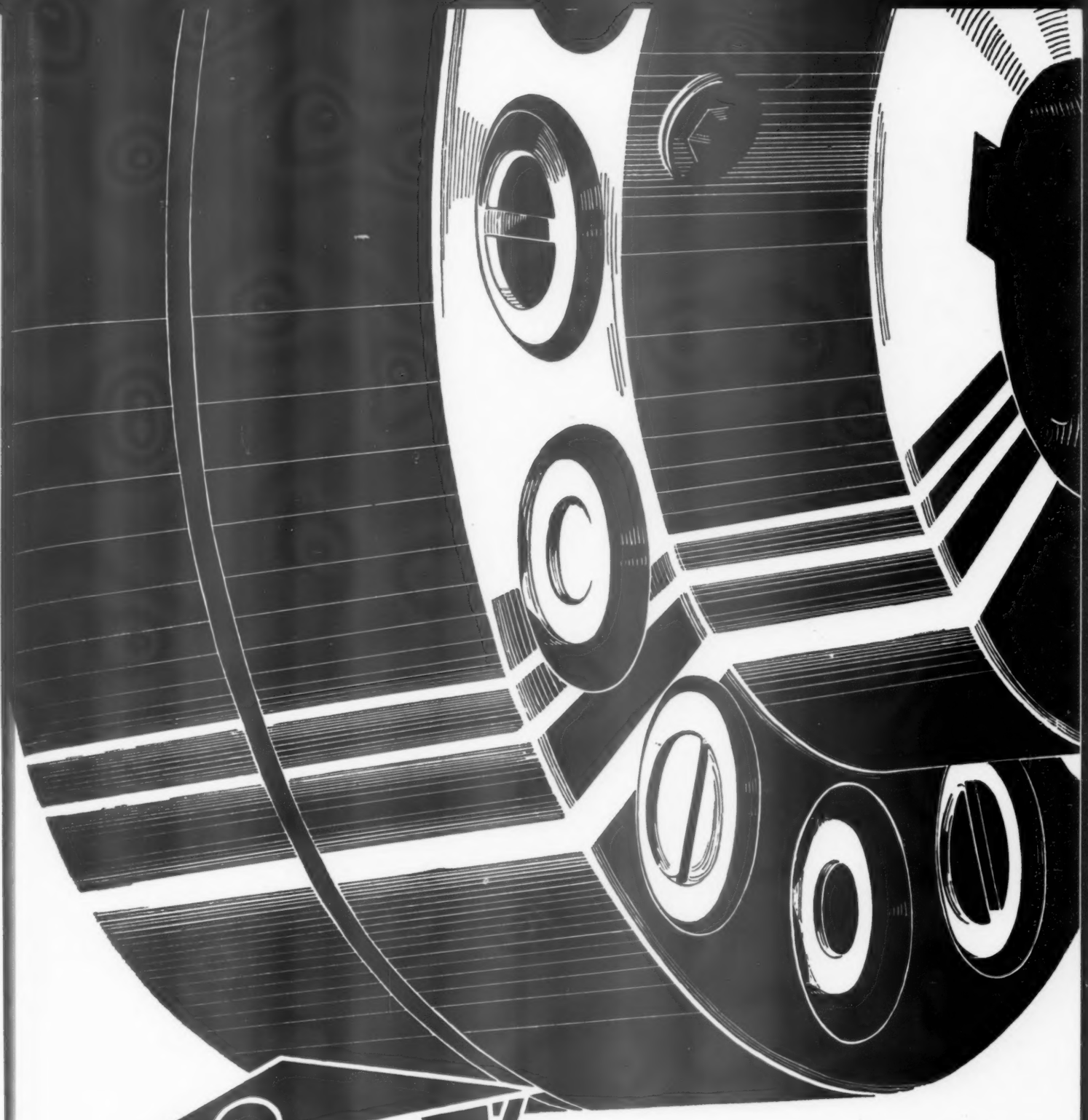
Fig. 2—Press base alone has depth of 15½ ft

Fig. 3—Stationary crosshead casting after cleaning

Fig. 4—Pattern used in making the stationary crosshead casting







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WESTFIELD, N. Y.

Foundry DEVELOPMENTS

HOT-TEARING of aluminum alloys studied by D. C. G. Lees and presented in the May issue of the *Journal*, Institute of Metals (London) led the author to conclude that the probable tendency of an alloy to crack by hot-tearing in castings can be assessed from the calculation of the amount of liquid which solidifies in a form characteristic of a eutectic. The latter is termed the eutectic index, and the author describes a method for calculating that figure. Large grain size also will increase those tendencies, but the presence of dissolved gas in the metal will tend to neutralize hot-tearing. It is recommended that where complicated castings are required in which it is impossible to arrange directional solidification to give complete feeding and to avoid solidification stresses, alloys should be chosen which contain considerable quantities of a phase which will solidify in a form characteristic of a eutectic. In aluminum alloys the presence of appreciable quantities of copper and/or silicon (particularly silicon) readily achieves that result. Control of grain size which should be as small as practicable is also desirable, and where necessary freedom from hot-tearing cannot be achieved conveniently by any other means, some gas to be evolved during solidification may be introduced into the metal.

• • •

RAPID method for spectrophotometric determination of small quantities of iron in magnesium alloys has been developed by the Engineering Division, Air Technical Service Command, Army Air Forces, and described in report PB-16520 available from the Publication Board, Department of Commerce, Washington 25. (photostat $1, microfilm 50 cents). Method is based on sensitivity of the reaction of ferric iron when combined with hydrobromic acid to form a soluble, orange colored complex. For alloys containing up to 0.05 Fe the method is accurate to 0.001 per cent.

• • •

SOUND principles now have been developed for the design and heat treatment of steels to give them mechanical properties demanded for any specific job according to J. L. Hollomon and L. D. Jaffe, Watertown Arsenal Laboratory. Studies were aimed at production of ordnance parts subjected to severe service, and the data is presented in report PB-18391 which may be obtained from the Office of Publication Board, Department of Commerce, Washington 25 for $15 for photostat copy and $2.50 for microfilm. Containing 154 pages the report is divided into ten chapters covering various phases such as phase transformations, heat flow and mechanical behavior, mechanical properties, quenching, hardenability, design principles, etc.

• • •

INVESTIGATION of the dendritic structures of columnar crystals by L. Northcott, and reported in the April issue of the *Journal*, Institute of Metals (London), indicates that whether the internal coring structure will be columnar or equi-axial depends not on the absolute rate of cooling, but upon the ratio of the rate of cooling normal to the mold face relative to the rate of cooling parallel to the mold face. That is to say:

$$f = \frac{\text{Temp. grad. normal to mold}}{\text{Temp. grad. parallel to mold}}$$

When the value of that ratio is high, the internal structure will be columnar; when it is low, the internal structure will be equi-axial. Significance of the conclusion is that a steep temperature gradient normal to the cooling face is not an absolute essential for columnar growth as hitherto has been considered, and columnar dendrites may occur under conditions of slow cooling.

• • •

INGENIOUS solution of a difficult problem recently was made in the laboratories of Sam Tour & Co., New York. It concerned the composition of a piece of metal forming a part of an intricate mechanism. Only facts known were that the material displayed magnetic properties and that there was a possibility of existence of a metal coating. As the piece was not replaceable, it could not be marred, tested with a file, microhardness tester, etch it or arc-spark it for spectrographic analysis. Solution was employment of x-ray diffraction apparatus which determined its space lattice constant. Specific gravity determination was made as well as a check of the coefficient of expansion. Results of the investigation indicated that the metal was a nickel-iron alloy known as invar containing 36 to 38 per cent Ni.

"Cost of hiring a genius is fabulous and usually impossible, and hiring brains is just as difficult. But do you need to go outside of your own organization to find a genius? As a matter of fact you, yourself, can be "the brains"—"the wonder boy"—"the genius of the foundry industry" if you want to be. And it won't cost anything but a little effort.

"Here's the formula—and at no charge: Get up from your desk (incidentally, nobody can run a foundry sitting at a desk) and walk slowly through your foundry. Keep your eyes open and remember, as you look around, that there isn't one single man-made object in your plant, or in the world, for that matter that can't be improved.

"Now look at your shoes. Are they dirty? Ideally speaking, you should be able to spend the morning in a foundry and still have a shine.

"Is your floor a hazardous mess? Are the gangways kept clean? How clean is the air? Isn't there some improvement you can make in the lighting? Wouldn't some kind of a monorail system speed up pouring? Are you charging by hand? Then mechanize. If you charge mechanically, can you think of some way to improve the process? For instance, could a man be eliminated? Could the job be made safer or easier? Could the accuracy of weighing the charges be improved? Is the best possible coke being obtained?

"Study the flow of materials. Do the molders wait for sand, cores, flasks, or anything else?

"Look for every little thing which delays production. Keep repeating to yourself: 'There must be a better way to do it!' You'll find ways. You'll discover many things and, if you keep it up day after day, you'll have a finer foundry. So fine, in fact, you'll think you hired a genius—and it was you all the time!—*The Whiting Founder.*

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READERS' COMMENT • • •

The "Tall-Boy" Bomb

To the Editors:

I was particularly interested in the illustration headed "CAST BOMB" on page 138 of your April issue.

I feel that your description might be misleading and as I am sure this is the last thing you would wish I am prompted to send the following comments.

The bomb in question is that which was known in this country as the "TALL-BOY" and was rated at 12,000 lbs. (six tons to you!) They had no fuse in the nose but were fitted with a hardened forged point.

This particular missile was aimed at a target in Arnsberg, which town lies at the bottom of a steep hillside. This bomb had hit a glancing blow on a rock projecting from the side of the hill which caught the bomb on its weakest place, that is the parallel section. This glancing blow heavily scored the side of the bomb and deflected it so that it fell sideways on to the road below where it broke up. The piece shown in your photo came to rest on the road leading down the hillside at a considerable height above the target.

I am sorry that Max Ganzauge is so modest, but perhaps I am to blame because it is certainly a very poor picture of him. I have, however, an exceedingly good photo of C. W. Briggs taken on the same trip which would be of very great interest to all American steel founders, but for fear of upsetting international foundry relations I dare not send you a copy, but Briggs has one.

Malcolm Brown

14 Oakholme Rd.
Sheffield 10, England

Questions Answers

To The Editors:

Replying to an inquiry in a recent issue of The Foundry you claimed that wrinkles and sand cracks on matchplate castings could be prevented by the use of strong facing sand. I doubt that this answer is completely correct. Are not sand cracks a result of the expansion and contraction of foundry sand as well as the strength? Expansion of the sand by a large flow of metal over it would cause a buckling or shifting of the mold resulting in sand cracks. Clay or other bond material increases contraction of the sand and tends to equalize the dimensional change. At the same time the stronger the sand, the more it can withstand the buckling tendency. Therefore it would appear that not only the added strength, but the added contraction of the material are jointly responsible for the improvement of the condition which is referred to.

On the same page 176, May issue, under the heading "Casting Method Is Different" the statement is made that in the majority of instances the metal is poured into a permanent mold at a temperature 50° higher than metal for a similar casting poured in a sand mold. I question this very much. It was always our practice to cast aluminum colder for permanent molds than for sand molds. Permanent molds usually are maintained at a temperature of 650-700 F., while sand molds are poured at room temperature. Therefore, no reason exists for pouring hotter metal into permanent molds.

Hiram Brown
Chief Nonferrous Metallurgist
Solar Precision Castings
Des Moines 5, Iowa

Editors' Note: As Mr. Brown points out, the cure of the defect is the result of a combination of factors rather than a single one. However, since the inquirer lacked sand testing equipment, the original reply had to be presented in practical terms, and to most foundrymen a *strong* sand means one high in bond which principally affects the expansion and contraction properties as well as other physical characteristics. Mr. Brown's comment on pouring temperature for permanent mold casting is appreciated. Original reply should have stated that the best pouring temperature is determined experimentally, and is the lowest at which full-run, sound castings are obtained.

Oil-Fired Furnace

To the Editors:

In the July issue of The Foundry I noticed a question in reference to building an oil-fired furnace for melting iron. Building and experimenting with melting units of various types for cast iron is a peculiar hobby of mine. I have built a number of types of furnaces, using various types of fuels to melt with, ranging from charcoal to coal tar and crude refinery wax.

Among the oil-fired units that I have preserved notes on, in the course of my experiments, is one that combines features of the air furnace and cupola stack. Using two oil drums mounted on steel framework in horizontal position. Drums fastened together with strap irons and lined to 17 in. diameter in middle and tapering to 10 in. at each end, forming an oval hearth to hold the molten iron. At one end is bolted the air-oil burner, at an angle to throw flame down into the hearth bowl. At the opposite end on top of horizontal drums is fastened in a vertical position two oil drums to act as a stack through which iron is charged. This stack is lined to 15 in. A tap out spout is located on one side, and slag spout on opposite side of horizontal drums.

In operation, scrap is charged into vertical stack, flames from burner sweep across hearth, striking and heating to melting point the scrap in stack, which melting runs into hearth, and is tapped out after first being slagged.

A furnace of 500 lb melting capacity will melt first heat in about one hour, succeeding heats in 30 to 45 minutes each, depending on temperature desired for pouring. Fuel consumption amounts to about 6 to 7 gal per hour depending on type of oil used.

Melting can be continuous or intermittent with this furnace at the option of the operator.

High test irons and semi-steels can be satisfactorily produced in this furnace and close control exercised over mixtures melted.

J. J. Paul

North Baltimore, O.

South American Foundry

To The Editors:

I have read with interest your article on page 215 of the April issue about the gray iron foundry that is to be erected in Rio de Janeiro, Brazil. You say that it is planned to be the largest on the South American continent and will have a projected capacity of 1000 yield tons per month.

Don't forget the Rancagua Foundries & Shops that is producing 1000 metric tons per month of steel, bronze and iron castings.

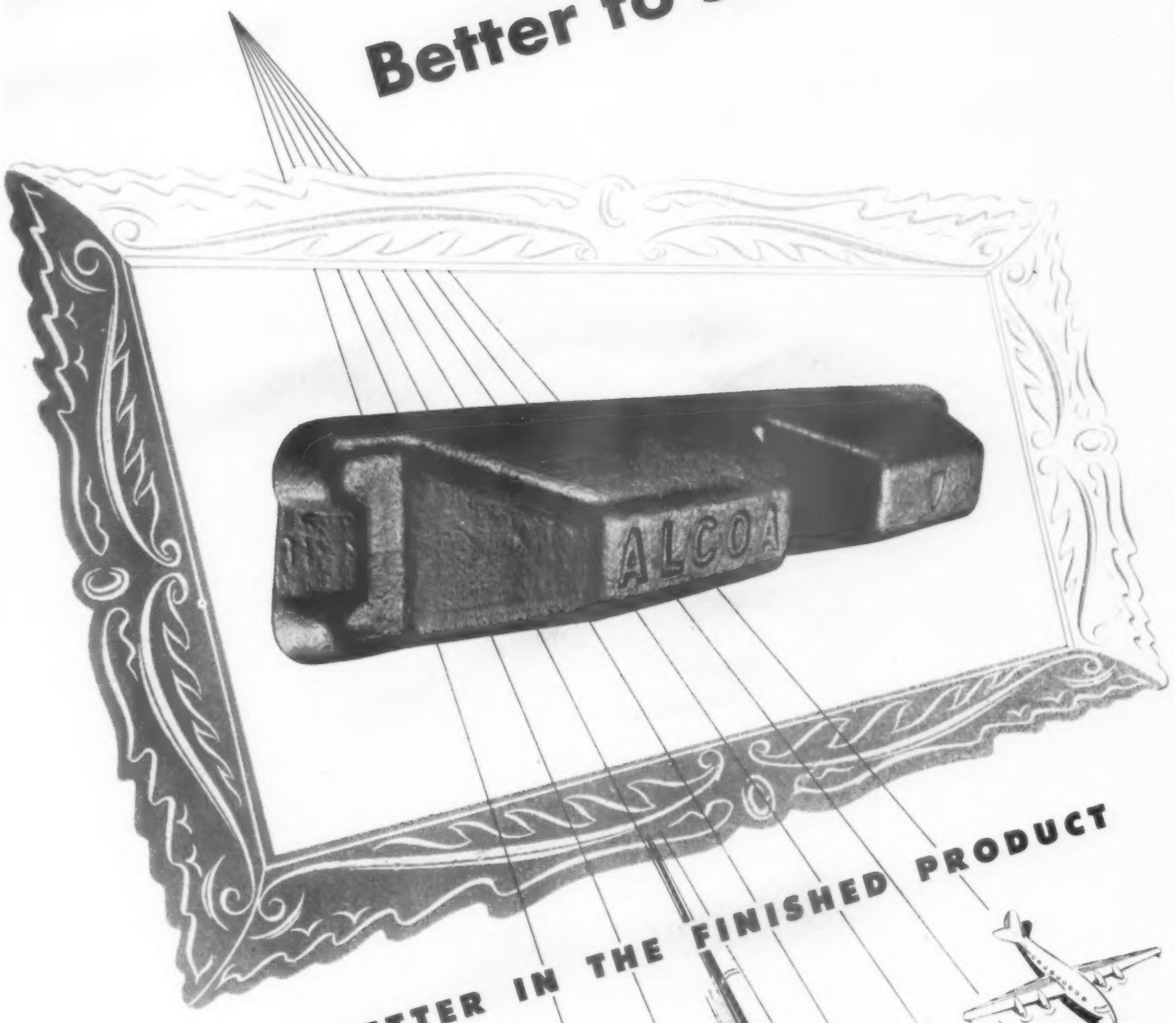
F. G. Broeker

Braden Copper Co.
Rancagua, Chile. S. A.

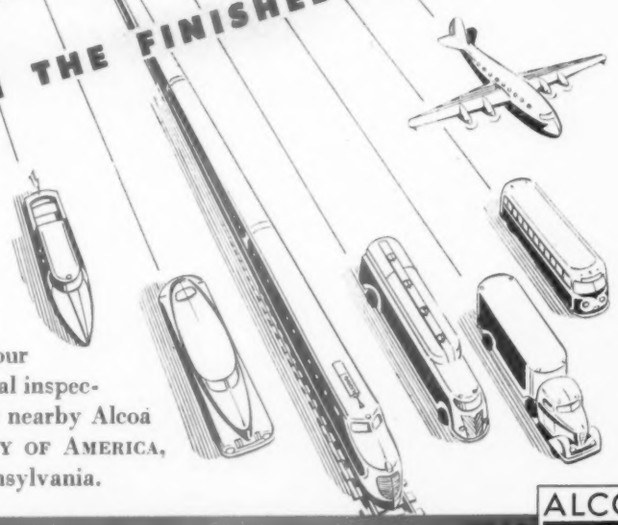
Sand Test Methods

Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England, has published a 38-page bulletin on *Methods of Testing Prepared Foundry Sands*. The bulletin comprises the first report of the Joint Committee on Sand Testing composed of representatives of the British Cast Iron Research Association, British Non-Ferrous Metals Research Association, Iron and Steel Institute, and the Institute of British Foundrymen. Bulletin describes methods and apparatus for testing sand, and may be obtained from the institute for 10s 6d.

Better to start with . . .



BETTER IN THE FINISHED PRODUCT



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Activities of foundry GROUPS

Chicago

NONFERROUS Founders' Society's Chicago Chapter staged its first annual golf tournament, July 12, at the Itasca Country Club. The splendid turnout, due to the untiring efforts of Walter Hunter, Hunter Foundry Co., chairman of the entertainment committee, coupled with the excellent support accorded by his assistants, marked the occasion as one of the highlights of chapter activities.

More than 60 members and guests tramped the fairways and gamboled on the greens from midmorning until early evening, almost half of that number carrying home prizes, thanks to the generosity of the suppliers, many of whom were on hand to share in the fun.

At the banquet in the evening 92 were present, with Grant Roth, chapter chairman, acting as toastmaster. The national organization was represented by Chester K. Faunt and Fred Haack Jr., directors. A floor show followed the dinner and it was agreed by all that Jack Hodgson knows how to pick 'em. Distribution of prizes concluded the program.

Altogether it was a day long to be remembered by those fortunate enough to be present, and much credit was due to the chapter officials who had the vision to sponsor this, the first of many more such worthwhile programs.—*H. J. Evans, assistant secretary-treasurer.*

Cincinnati

OFFICERS elected to serve the Cincinnati District Chapter of the AFA during the year 1946-47 are as follows: Chairman, Joseph Schumacher, Hill & Griffith Co.; vice chairman, Edgar J. Kihn, Cincinnati Milling Machine Co.; secretary, E. F. Kindinger, Williams & Co.; treasurer, Charles Dold, Portsmouth Steel Corp.; assistant treasurer, Walter A. Funck, Reliance Foundry Co., of Cincinnati.

Directors of the chapter include: Emil Albrecht, Aluminum Foundry Co.; Arthur A. Alfers, Oakley Pattern & Foundry Co.; George A. Avril, G. A. Avril Smelting Works; Robert G. Ebersole, Miller & Co.; Charles H. Fredericks, Cincinnati Milling Machine Co.; H. F. McVay, Delhi Foundry Sand Co., of Cincinnati; Luke D. Fahey, Dayton Casting Co.; A. W. Schneble, Advance Foundry Co., of Dayton, O.; Stanley F. Levy, Black-Clawson Co.; Paul Ziegler, H. P. Deuscher Co., of Hamilton, O.; Charles D. Steinmeier, A. D. Cook Inc., Lawrenceburg, Ind.— *E. F. Kindinger, secretary.*

NORTHERN CALIFORNIA: Group pictured at annual Ladies Night of the Northern California Chapter, AFA, includes, left to right: Dan Henry, entertainment committee chairman; Fred Aicher, secretary; Charles Marshall, publicity chairman; Ralph Noah, past president, 1944-45; Charles Hoehn Jr., retiring president; Richard Vosbrink, president-elect; Charles J. P. Hoehn, past president, 1937-38; Andrew M. Ondreyco, vice president-elect

Texas

FINAL meeting of the 1945-46 season was held June 20 by the Texas Chapter of the AFA, at the Golfcrest Country Club, Houston, Tex. Chairman E. P. Trout presided, with 35 members and guests in attendance. The following visitors were introduced: Ira Doll, Cameron Iron Works; A. G. Wallace, Acme Brick Co.; Mr. Collier, Garrot Brass Co.; J. H. Time, Lufkin Foundry & Machine Co.; L. P. Lee, East Texas Steel Co.; Dr. T. Shearer, Lufkin.

F. M. Whitlinger, a national director of the American Foundrymen's Association, assisted in counting of ballots for election of new officers to serve during the 1946-47 season and announced results as follows: Chairman, William M. Ferguson, Texas Electric Steel Casting Co.; vice chairman, L. H. August, Hughes Tool Co.; secretary-treasurer, Harry Wren, R. Lavin & Sons. These companies are located in Houston. Directors elected include George E. Bryant Jr., Oil City Brass Works, Beaumont; L. M. Orin, East Texas Electric Steel Casting Co., Longview; R. H. Glenney, Alamo Iron Works, San Antonio; DeWitt McKinley Iron Works, Fort Worth.

Mr. Trout commended William Ferguson, former vice president and program chairman, for his good work during the year and expressed appreciation in behalf of the chapter. Mr. Ferguson briefly reviewed benefits derived from chapter meetings and solicited suggestions for ways of making future meetings more interesting, urging members to express their desires in this connection. As incoming president he announced the following chairmanships for next season: Entertainment—L. N. Crim. Publicity—R. H. Glenney. By-laws—F. M. Whittlinger. Membership—Walter Temple.

L. H. August raised the question of lack of attendance of engineers at chapter meetings and pointed out the value of getting them to future meetings. He urged that something be done about this during the coming season. Mr. Raymond, president, Houston Foundry & Machine

(*Continued on page* 149)

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BINDER
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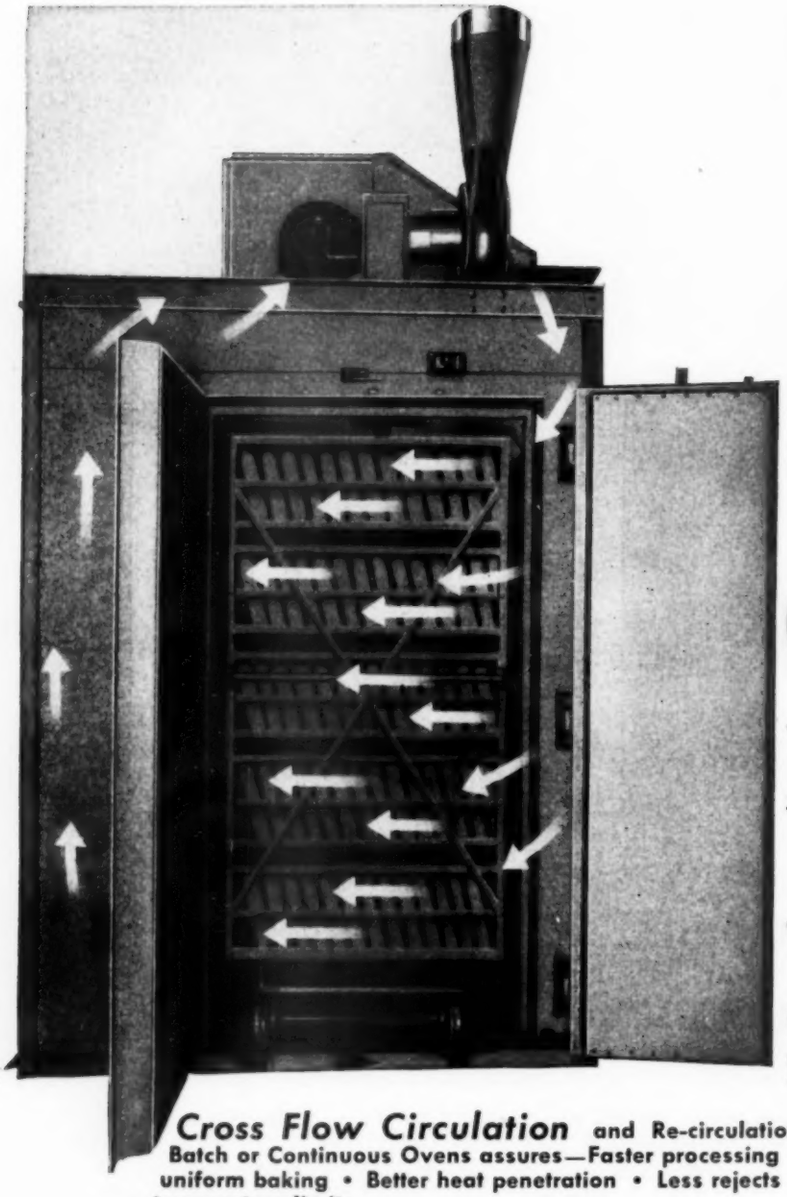

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Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning tear-downs. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

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PAINT SPRAY HEATING, VENTILATING, COOLING DRYING, HUMIDIFYING SYSTEMS, JAPANNING AND INDUSTRIAL OVENS, INDUSTRIAL WASHING MACHINES

(*Continued from page* 146)

Co., Houston, outlined his experiences during the membership drive of NRA and suggested that a similar method could be used in securing more members for the Texas Chapter. He suggested that a survey could be made of all Texas foundries and related industries and that men could be employed or designated to make telephone calls at frequent intervals.

Mr. Whittlinger suggested that chapter programs include at least one round-table discussion during the year. Such discussions would basically carry out the purpose of AFA and would probably interest engineers who might be invited, to take part in discussions.

The chapter will resume meetings in September.—*R. H. Glenney.*

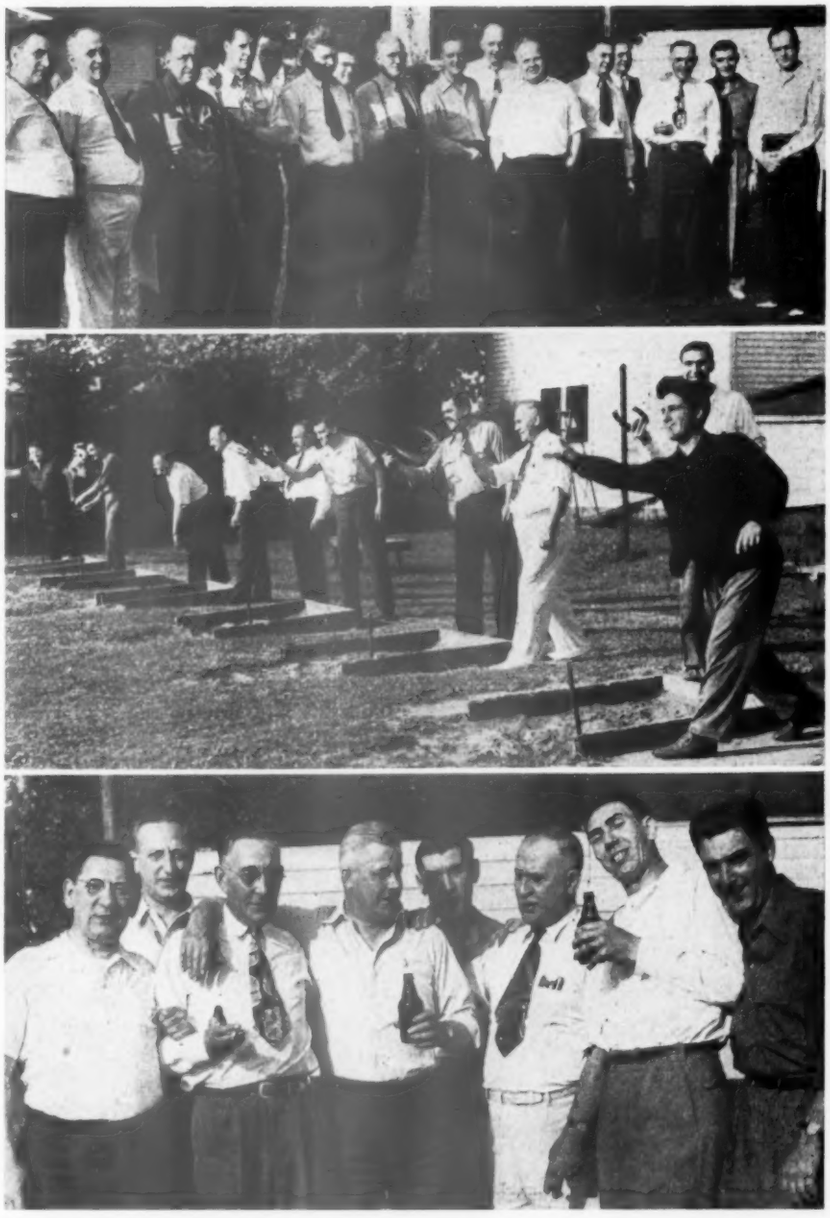
Northern California

HIGHLIGHT of the annual business meeting of the Northern California Chapter of the AFA, held June 14, was the election of officers and directors for the year 1946-47. Officers elected are: President, Richard Vosbrink, Berkeley Pattern Works; vice president, Andrew M. Ondreyco, Vulcan Iron Foundry Co.; secretary, J. F. Aicher, E. A. Wilcox Co.; co-secretary, Charles R. Marshall, Chamberlain Co.; treasurer, J. K. Benedict, Donald Kenneth Co.

Directors, two-year term: Harris M. Donaldson, Brumely Donaldson Co.; William W. Clark, Enterprise Engine & Foundry Co.; Fred T. Williams, Empire Foundry Co.; Leon Cameto, Production Foundry Co. Allen C. Axford, Mission Foundry & Stove Works, and Norman Barnett, M. Greenbergs Sons, were elected to fill unexpired terms of Ralph Noah and Gus Penning.

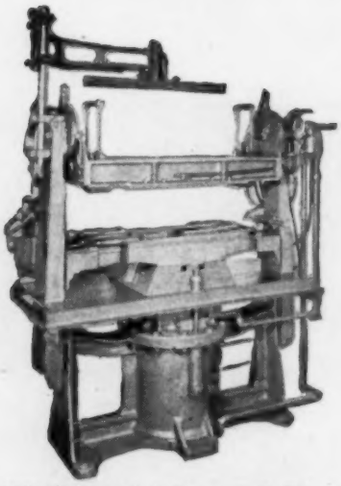
Retiring President Charles Hoehn Jr. reviewed the year's activities and programs and made the following recommendations in his annual report. There will be a new patternmakers apprentice committee; the suggested Pacific coast

(*Continued on page* 152)



WESTERN NEW YORK: Scenes at the annual picnic and election of officers of the Western New York Chapter, AFA, when about 300 members and guests gathered at Kudara Farms, Hamburg, N. Y., June 15. Picnic activities were under the direction of J. Ralph Turner, Queen City Sand & Supply Co., and his committee. (Photos courtesy of Jack Heysel, E. J. Woodison Co., Buffalo)

#193 Osborn Blower, draw piston type



#333 Osborn Jolt-Squeeze Rollover

#94 Osborn Core Blower

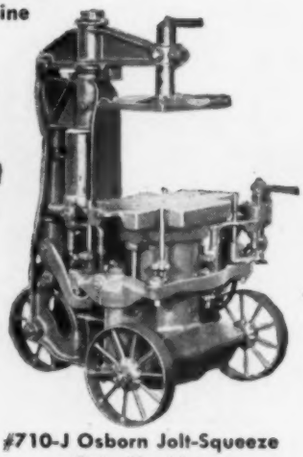
#442 line Jolt Rockover Machine

#146 Osborn Core Box Drawing Machine

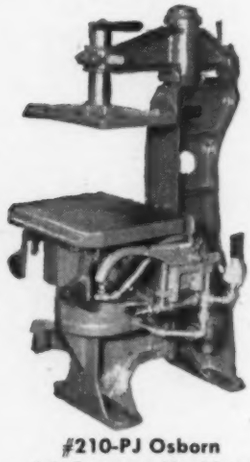
#405 Osborn Jolt Rollover

#539 Osborn Jolt Strip Machine

#559 Osborn Jolt Strip Machine

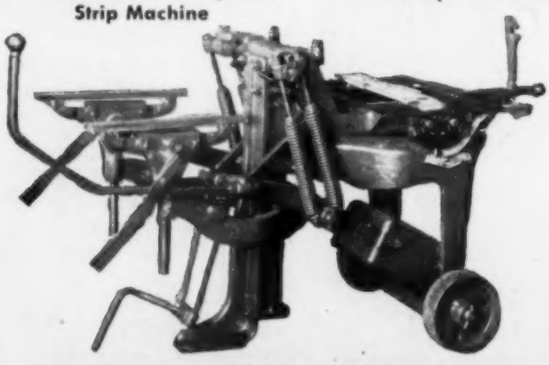


#710-J Osborn Jolt-Squeeze Strip Machine



#210-PJ Osborn Jolt Squeeze Machine

#413 Osborn Jolt Rollover



#42 Osborn Hand-Operated Rockover Core Machine

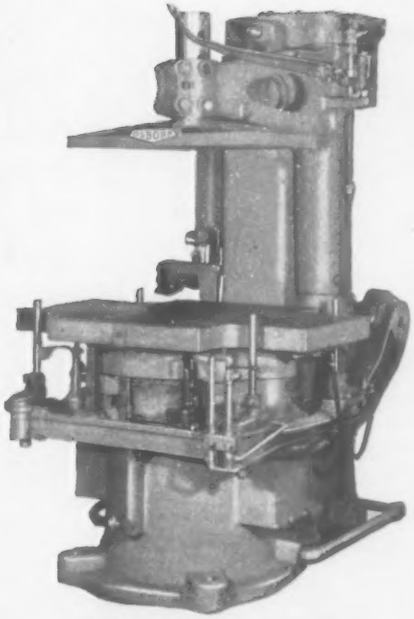
Many types not illustrated. Write or wire for complete information.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

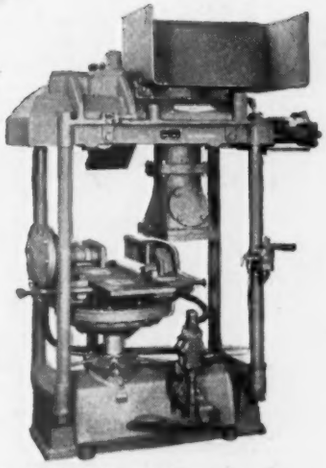
OSBORN features the MOST COMPLETE LINE OF MOULDING and CORE BLOWING EQUIPMENT for foundries

#275-J Osborn
Jolt-Squeeze Machine

#1024 Osborn Jolt-Squeeze
Strip Machine



#724-PJ Osborn Jolt Squeeze
Strip Machine



#93 Osborn Core Blower

MEMBER

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES

(*Continued from page* 149)

conference should be held; new and capable workers should be obtained for the foundry industry; suggested good housekeeping steps should be followed up. President Hoehn concluded by thanking fellow officers, committees and members for their support and co-operation during his term.

Guests at the business meeting included Wes Cable, Induction Heating Corp., New York, who talked on "Dielectric Heating;" Bob Hannon, member of the Chicago Chapter and associated with Beardsley & Piper, and D. Hansen, Grubb, Pacific Scientific Co., San Francisco.

New members introduced were Ernest Boynton, Enterprise Engine & Foundry Co., and C. C. Beckett, Gladding McBean & Co.

Pacific Gas & Electric Co.'s motion picture "Hydro," which tells the story of California's water power development, was shown after the business meeting.

Annual Ladies' Night was held June 28 and was attended by 122 members, their wives and guests. Outgoing President Charles Hoehn Jr. was given a gift and card having an original painting on the outside depicting the Northern California Chapter hand rammer gavel and flask and also the AFA seal. Inside was a hand-lettered expression of appreciation by the members for the work he did for the chapter during the year. All members present signed the card. Chairman Dan Henry and his entertainment committee arranged an enjoyable program of entertainment, dancing and refreshments.—*Charles R. Marshall, publicity chairman.*

DINNER DANCE: Some of the approximately 200 who attended the annual spring dinner dance of the Western New York Chapter, AFA, held at the Buffalo Trap and Field Club, Buffalo. (Photos courtesy of Jack Heysel, E. J. Woodison Co.)

Wisconsin

ELEVENTH annual foundry outing, stag and dinner of the Wisconsin Chapter of the AFA, with many members and guests playing golf all day, or as long as they could stand it, was as big a success as could be hoped for. It was held July 19 at the New Ozaukee Country Club, near Milwaukee. The weather could not have been better, and while all of the 640 members and their friends did not play golf, various other means of entertainment were available. A number of card games were in progress most of the day; in fact, one prominent member of the chapter became so engrossed in a bridge game he almost forgot to go to dinner.

In the golf tournament, J. B. Arthur and Jerry Frost tied for low gross with 74, and Jim Harley shot a hole in one on the eighteenth. Refreshments during the day held up fairly well, although a shortage—common to the times—developed in Milwaukee's most famous product during the afternoon.

Attendance prizes were distributed in the form of about 40 merchandise certificates, good for a certain amount of goods to be selected by the lucky ones. Concluding the program was an excellent floor show, which was enthusiastically received—*John Hubel.*

Twin City

MAY 1 meeting of the Twin City Chapter of the AFA was held at the Curtis Hotel, Minneapolis. G. K. Dreher, formerly vice president, Ampco Metal Inc., Milwaukee, and now vice president and general manager, Rogers Pattern & Foundry Co., Los Angeles, was guest speaker.

Mr. Dreher, a national director of the AFA, discussed the use of bronze, covering its application in various phases. He stressed the necessity for employing only clean, home scrap in preparing bronze mixes and gave considerable time to the discussion of heading and gating the molds. Interesting points were brought out concerning high tensile aluminum bronzes. A motion picture produced by Ampco Metals, entitled "Golden Horizons", featuring copper base alloys, was an interesting addition to the program.

Officers were elected to serve the chapter for the year 1946-47. They are: Chairman, H. M. Patton, American Hoist & Derrick Co., St. Paul; vice president, Sheldon P. Pufahl, Paul Pufahl & Son Foundry Co., Minneapolis; secretary-treasurer, Alexis Caswell, Manufacturers' Association of Minneapolis Inc. Directors elected to serve for three years include: Carleton C. Hitchcock, Edwin R. Frost

(*Continued on page* 154)

TIMKEN TAPERED ROLLER BEARING EQUIPPED

45,000 pounds per bite WITH TIMKEN BEARINGS taking the load

The ore bucket shown in the photograph is one of the largest ever built, weighing 49,000 pounds and having a nominal rated capacity of from 45,000 to 50,000 pounds per bite. It was designed and built by Blaw-Knox Company, Pittsburgh, Pa., who supplied 4 of them to a large Chicago steel company where they went into operation in the summer of 1941.

All sheaves turn on double Timken Tapered Roller Bearings, and as shown by the bucket manufacturer's records, no bearing replacements have been made to date.

This is the kind of bearing service you need and should have not only in ore buckets but in every other kind of steel mill equipment as well, including hot and cold rolling mills, rolling mill drives; pinion stands and runout tables; shears; cranes; ingot cars; ladle cars and slag cars.

To be sure of getting this kind of service when buying Timken Bearings, look for the trade-mark "TIMKEN" stamped on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

(*Continued from page* 152)

and Robert C. Wood. For two years: Clifford Englund.—*J. W. Costello.*

Chicago

PLANS are shaping up rapidly for the regional foundry conference to be held at Hotel Continental, Chicago, Nov. 21-22, under joint sponsorship of the Chicago and Central Illinois Chapters of the American Foundrymen's Association. Co-operating in the event are Illinois Institute of Technology, Northwestern Technological Institute and University of Illinois.

Committees are formed and are functioning under general chairmanship of Alfred W. Gregg, executive engineer, foundry equipment department, Whiting Corp., Harvey, Ill. Arrangements contemplate an attendance of approximately 750 for the two-day conference, first held in the district since 1941.

At the opening general session, James Thomson, works engineer, Continental Foundry & Machine Co., East Chicago, Ind., and chairman of the AFA plant and plant equipment committee, will discuss "Good Housekeeping and Plant Maintenance."

Dr. H. T. Heald, president, Illinois Institute of Technology, Chicago, will speak at the first day's luncheon, and Dean O. W. Eshbach, Northwestern Technological Institute, Evanston, Ill., at the luncheon on the second day. Clifton Utley, well known news commentator, will address the banquet audience.

During the two days, group sessions will be held on Gray Iron, Malleable, Steel, Nonferrous and Patterns.

Among subjects scheduled for Gray Iron sessions are cupola operation and control, refractories, sand control and binders, equipment progress, and time study in connection with incentive systems.

Malleable sessions will feature discussion on metallurgy, modern melting and annealing, gating and feeding, and consumer requirements for malleable castings.

Costs, sands, aluminum bronze and gas pores in aluminum are subjects scheduled for nonferrous sessions.

Pattern sessions will devote attention to jobbing patterns, pressure plate and new pattern equipment, permanent molds and equipment, and core blowing equipment.

SOUTHERN CALIFORNIA: General view of the group invited to the first meeting of Southern California chapter, Nonferrous Founders' Society is shown in the center. At the top, left to right, are: James Wolfe, field representative of the NFS; A. E. Pye, treasurer of the NFS, and F. A. Mainzer, Pacific Brass Foundry, San Francisco. First directors of new chapter are shown at the bottom, lower row, left to right: W. E. Storm, Western Brass Works, Los Angeles; Ken R. McIntyre, Modern Pattern & Foundry Co., Los Angeles. Upper row: Joe D. Troncale, Alum-Foundry, Los Angeles; Jack Cassell, Compton Metals Co., Compton, Calif. and A. L. Goodreau, G. & B. Brass & Aluminum Foundry, Los Angeles.

Start New Chapter Of Nonferrous Founders

A Southern California chapter of the Nonferrous Founders' Society was organized in Los Angeles, July 18. The following five directors were chosen and instructed to choose a permanent chairman at a later date: Joe D. Troncale, Alum-Brass Foundry, Los Angeles; Jack Cassell, Compton Metals Co., Compton, Calif.; A. L. Goodreau, G. & B. Brass & Aluminum Foundry, Los Angeles; W. E. Storm, Western Brass Works, Los Angeles, and Ken R. McIntyre, Modern Pattern & Foundry Co., Los Angeles.

Purpose of the organization is to further the work of the national society in the Southern California area.

Malleable Iron Group Meets With CPA

Average production of foundry and malleable iron during the first six months of 1946 was 360,000 net tons per month —26,000 net tons per month less than during the same period in 1945. The peak was reached in March with 436,000 net tons and the low in May with 268,000, according to Civilian Production Administration which attributes the lowered production to a shortage of pig and scrap iron.

In addition to a scrap metal drive, CPA is recommending that, if necessary, the pig iron top price be adjusted to encourage increased production and is asking several producers of pig iron to re-open their idle furnaces.

Malleable iron industry advisory committee in its first meeting under the sponsorship of CPA suggested that foundry pig iron controls—under Direction 13 to M-21—be dropped on Sept. 30 because it is believed the shortage will then be over. The committee also urged that CPA urge the Office of Defense Transportation to continue supervising the utilization of all available coal cars for transporting coal from mines to foundries.

(*Concluded on page* 156)

A SLEDGE IS A LUXURY

IT MAY NOT SEEM TO BE. But every time you use a sledge hammer or any manual tool to free castings . . . it costs you money! It costs you time! It costs you production! Yes . . . a sledge hammer is a luxury!

BUT WHEN ROBINS FLOATEX SHAKEOUTS ARE PUT TO WORK—

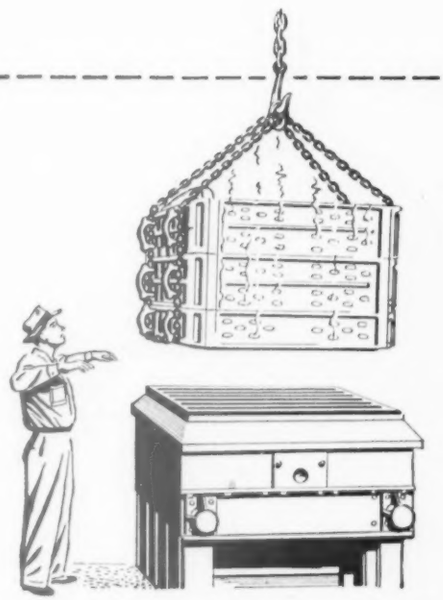
They do your job *cheaper.* They're "Job-Engineered" to free *your* castings . . . at *your* specific production rate.

They do your job *faster.* They bounce tons free in minutes, not hours.

They do your job *better.* They shake the flask, not the building. Flasks and castings are shaken free without injury.

Yes . . . you'll find it pays to check with Robins *first!* Remember, there's a portable or standard Robins Floatex Shakeout designed for *your* job.

ROBINS
FLOATEX SHAKEOUTS



"Job-Engineered" to Solve Your Problem
CHEAPER . . . FASTER . . . BETTER

Robins Conveyors Incorporated, Passaic, New Jersey—Division of Hewitt-Robins Incorporated

(*Concluded from page 154*)

The committee also suggested that CPA issue a limitation order restricting the uses of soil pipe, which in many instances is being used to carry away rain water and for other uses where a less critical product could be substituted. It was also recommended that the possibility of salvaging pressure pipe from closed war installations, such as army camps, be investigated.

According to CPA, industry requirements for foundry nails and core wire can be met from current production. Although total nail production has registered a gain of about 35 per cent, foundry nails are a special order item and are not regularly stocked by suppliers. Minimum requirements for core wire should not be too difficult to meet.

A Solid Fuels Administration representative told the committee that the outlook for increased coal deliveries is still poor inasmuch as a large percentage of coal transportation facilities are being used for shipping coal to the Great Lakes region for winter stockpiles and to meet needs of lake cities' public utilities. A Department of Agriculture representative said the outlook is brighter for processed corn used as a core binder in the malleable iron industry since the removal of price controls enables the dry millers to bid for their requirements of corn on the open market.

Members of the malleable iron industry advisory committee are: C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis.; L. A. Dibble, Eastern Malleable Iron Co., Naugatuck, Conn.; Charles A. Gutenkunst, Jr., Milwaukee Malleable & Gray Iron Works, Milwaukee; Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; Robert J. LaMarche, American Malleable Castings Co., Marion, O.; W. H. Moriarty, National Malleable & Steel Corp., Cleveland; K. M. Smith, Lancaster Malleables & Steel Corp., Lancaster, N. Y.; John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill.; Frank E. Shumann, Lehigh Foundries Inc., Easton, Pa. and B. A. Dollens, Saginaw Malleable Iron Div., General Motors Co., Saginaw, Mich.

Drexel Institute To Add Metal Courses

Drexel Institute of Technology, 32nd and Chestnut, Philadelphia, will establish courses in metallurgical engineering, according to a recent announcement of

PROF. A. W. GROSVENOR

Dr. James Creese, president of the institute.

The new courses, under the direction of Prof. A. W. Grosvenor, will lead to degrees of bachelor of metallurgical engineering and master of metallurgical engineering, degrees not previously granted at Drexel.

Advisers from industrial laboratories and plants who have accepted appointments to the advisory board include Dr. G. H. Clamer, Ajax Metal Co.; William J. Diedrichs, Autocar Co.; Francis B. Foley, Midvale Co.; Clyde B. Jenni, General Steel Casting Corp.; Norman C. Mochel, South Philadelphia Works of the Westinghouse Electric Corp. and Joseph Winlock, Edw. G. Budd Mfg. Co.

The new courses of study, according to Professor Grosvenor, will include metallography; production of nonferrous metals and iron and steel; foundry metallurgy; metallurgy of welding, including radiography, approached as an engineering rather than as a mechanical problem; corrosion and heat resistance of alloys and advanced materials of construction. Curricular emphasis at Drexel will be placed on physical metallurgy.

Report Analyzes 1945 Shipments
OF STEEL CASTINGS

STEEL Castings—1945," a digest prepared by the Bureau of the Census of the industry's record for last year, combines monthly data for the larger steel foundries with annual data for the remaining foundries to provide a complete picture of the steel casting industry. Larger foundries are classified as those whose average monthly shipments exceed 150 tons of carbon and alloy steel castings combined, or 75 tons of alloy steel castings.

Tables and charts presented in the digest give a detailed breakdown of shipments and unfilled orders by grades of steel, type of furnace and geographical division.

During 1945 steel castings were produced in 37 states. Most of the steel foundries are concentrated in the Middle Atlantic and East North Central states, and these foundries shipped 1,541,483 short tons, or 79 per cent of all steel castings shipped. Pennsylvania foundries led the states in shipments with 510,679 tons, followed by Ohio and Illinois with 268,346 and 260,305 tons, respectively. These three states accounted for more than one-half the total steel castings shipped.

Total shipments in 1945 amounted to 1,942,477 tons and of these 1,434,473 tons, or 74 per cent, were carbon steel and 508,004 tons, or 26 per cent, were alloy steel. A little under one-half of the total shipments, or 900,600 tons, were produced in electric furnaces, and 1,041,877 tons were produced in other types of furnaces. Over three-quarters of the steel castings shipped, or 1,484,957 tons, were for sale to the trade; the other 457,520 tons were produced for the manufacturers' own use.

Peak monthly shipments were reached in March with 222,591 tons, and after VE-Day dropped sharply to 115,239 tons in December. During this period shipments of alloy steel castings dropped over 60 per cent from the March figure and carbon steel castings declined 40 per cent.

Decline in volume of unfilled orders for steel castings was greater than the drop in shipments. In each of the first four months of the year unfilled orders totaled approximately 1,000,000 tons. By the end of December the backlog of orders had dropped to 434,287 tons, approximately 59 per cent under the March peak.

Data for 347 steel foundries are included in the survey. Of this total 18 foundries which had produced steel castings during 1945 discontinued activity, and at the end of December the number of active steel foundries in the United States totaled 329. Tonnage given in the report are the weights of the rough castings after the gates, risers, sprues, etc., have been removed.

Fittings Decreased

Printed copies of Simplified Practice Recommendation R212-45 on Cast Brass, Solder-joint Fittings are now available, according to the Division of Simplified Practice, National Bureau of Standards. Recommendation sets up a stock list of 37 types of fittings in various sizes.

TWENTY WAYS
TO DO GRINDING JOBS BETTER AND FASTER!

STERLING'S STERMOUNTS offer positive solutions for your perplexing, difficult grinding and polishing jobs. The twenty shown to the right are but a few of many shapes and sizes which are available to use in those hard-to-get-at locations where good grinding seems impossible.

Sterling's Stermounts are made in both vitrified and resinoid bonds to widen their usefulness for grinding all types of metals . . . they have the correct outlines to fit into all types of holes and recesses.

Sterling's Stermounts have the added advantage of removable spindles that can be used over and over again. These spindles are made in two sizes to add extra rigidity and safety to the Stermounts when they are in use.

Sterling's Stermounts hold their cutting qualities and do a quick job on all kinds of metals without undue pressure being exerted. They are sturdy and tough . . . provide long grinding life.

Want to cut costs with Stermount? Drop us a line today, and we will tell you how to do it.

"THE WHEELS OF INDUSTRY"

Sterling

● The complete Stermount line of wheels and shapes is shown in this attractive folder which is available for distribution. Send for your copy . . . it gives measurements and prices of each type . . . describes the spindles, too!

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Program for Foundry Training

(*Continued from page* 75)

In addition to scheduled activities, the training staff offers assistance in devising plans for meeting any current need in training. Practical courses, such as blueprint reading, shop mathematics and business English are offered to those desiring instruction in such subjects. Plant tours are arranged for such groups as sales, auditing, purchasing and engineering personnel in order to give them a clearer understanding of the relationship of their duties to plant operations. Detailed outlines are prepared in advance so the tours will center around the interests of the visitors.

While the activities which have been outlined serve as means of communication and co-ordination between different levels of the supervisory group by providing a two-way channel for the flow of information, the real pay-off of a training program must come largely from improvements at the plant job level. It is here that training can be most effective as a means of improving quality, quantity and of securing favorable costs. It is these people who can improve the safety record, take better care of equipment and promote better human relations within the company.

Provide Intensive Training

The most intensive training on the plant level is that given through our apprentice training program. Young men with a minimum of high school education who indicate that they have the aptitudes and interest are enrolled in four-year courses of instruction which prepare them for the trades of electrician, machinist, patternmaker, molder or all-around foundrymen. Here again the training is directed toward developing men as well as journeymen in their trades. Their classroom work and practical experience in the shop are planned to give them a well rounded working knowledge and a broadened understanding of the technical phases of all our processes. In addition to classroom subjects such as mechanical drawing, mathematics, economics, metallurgy and foundry practice, the different department heads of the company address the students and explain the function of their departments in the organization. The apprentice also has practice in public speaking by being allowed to talk before the group upon any subject he may choose. The rate of pay for apprentices is increased at fixed intervals so long as his work both in the schoolroom and the plant is satisfactory.

Many of our present foremen are former apprentices, and we find the apprentice school an excellent training program for those who show capacity for executive responsibility.

Since the greatest need for training in our company is presented by the people who have been employed within the past two years and those who have been placed on new jobs because of changes in products and equipment, major efforts have been directed toward helping these employees. While training is one of the first responsibilities of a foreman and it should always be done under guidance, it was evident that he could not give the necessary time to the individual learners when they constituted so large a part of his work force. Where these conditions prevail, we have selected and trained full-time job instructors who report directly to the foreman.

Demonstrate Ability To Teach

The selection of job instructors has been done chiefly through actual demonstration of their ability to teach. If the instructor can visualize himself as being in the place of the learner and has the ability to present the job with patience, in simple terms and in such a manner that the learner is motivated to use his best efforts, he need not be one of the most highly skilled operators. In fact, the man who is most skilled will often be a poor instructor as he will not have the patience and understanding necessary to adjust his presentation to the level of the untrained man. The job instructor must have a well balanced personality, good judgment and must maintain the respect of the people he instructs.

Even though the instructor may have all the necessary qualifications and native characteristics, he will need careful coaching in correct teaching methods. Our pattern for instruction follows the well known four-step method of preparation of the worker, presentation of the operation, tryout of performance and followup. Since we learn best by doing, the most effective means we have found for preparing the instructor is to have him demonstrate the teaching of actual plant jobs before foremen and members of the training staff until we know that the proper procedures have been thoroughly mastered and will become habitual practice when the instructor enters upon his duties.

Our next step in preparation for job training is that of making a complete analysis of all the operations of the department in which training is to be done. The job instructor and a member of the training staff first observe the operations and break them down into details. During this process, notes are kept which show the manner in which the work is done, the personal injury hazards involved, differences in work practices of different operators and any questions which the observers may wish to clear up with department supervision. The breakdowns with notes are then typed, and copies are furnished to all supervisory personnel who have responsibility for the work being analyzed. The data are then gone over by each person involved and suggestions are made for their correction or improvement. Any points on which there is a difference of opinion are ironed out. The final decision as to standard practice is left with the department head. This process serves to standardize the work in the best manner known at the time and clarifies any questions as to how the job shall be outlined for instruction purposes.

After all points as to methods have been settled, the information is ready for use in compiling instruction outlines. This is done by listing the steps in the operation on the left half of the sheet with all instructions for the performance of the item opposite the step on the right half of the sheet. On items where the purpose of the work is not self evident, a brief and simple explanation of the purpose follows. These outlines are worded in simple language with an effort to avoid foundry terminology. Since safety is largely a matter of correct work habits, each hazard is pointed out to the worker when he reaches that point in the work. The safe method is then included as part of instructions and made standard practice.

Method Is Comparatively Simple

It can be seen that the application of this method to short cycle operations and those that are machine controlled is comparatively simple, but the question will occur as to how work such as hand coremaking and molding can be broken down into teaching units. Naturally it is not feasible to make breakdowns for each new casting or core which comes into the foundry. In this type of work it is necessary to prepare instruction material on all the different methods that may be employed in accomplishing any feature of the work. As an illustration, our instructor's guide on coremaking lists six methods by which a core may be vented, with instructions for the performance of each. The instructor therefore can refer to the method which is applicable to the job he is to teach and organize his presentation accordingly.

The instructor's guide does not seek to give a full explanation of every item of work but it does attempt to list all the things an employee should learn to do during the course of his training. The

(*Continued on page* 161)

"The most TROUBLE-FREE Foundry Unit I ever had in my Foundry!"

MEMBER

This is a direct quotation from a statement made by the General Superintendent of a large Eastern steel foundry. A SIMPLICITY 8′ x 10′ Dual Shake-Out, such as illustrated by the cut, is the machine covered by the quotation. The 8′ x 10′ Dual Shake-Out was installed in this steel foundry in 1942 and has been in active service since that time. The first SIMPLICITY Gyrating Shake-Out was installed in a malleable iron production foundry in March 1933. Since that time 53 different sizes and models of shake-outs have been built to meet customers' requirements. Today, SIMPLICITY Shake-Outs are operating in 310 gray iron foundries, 188 steel foundries, 130 non-ferrous foundries and 40 malleable iron foundries. The SIMPLICITY Gyrating Shake-Out filled the urgent need for a high-speed, efficient flask shake-out and casting knock-out unit. These points were bottlenecks in nearly every operation, before the SIMPLICITY units were installed.

Simplicity

TRADE MARK REGISTERED

ENGINEERING COMPANY

DURAND, MICHIGAN

DON'T GAMBLE WITH *Accuracy*

MILWAUKEE JOLT SQUEEZERS

. . . Give you a Solid Impact Jolt and Maximum Squeeze Pressure at All Times

Why take chances producing ram-offs in your molding operation? Ram-offs are impossible with Milwaukee Jolt Squeezers. The arm has direct contact with the back frame when pressure is applied squaring up the platen with the table. The squeeze valve is on the arm for safe and convenient operation. The jolt and vibrator valves are knee operated. Simple in design . . . ruggedly constructed . . . and machined to close tolerances . . . these dependable Jolt Squeezers enable you to produce BETTER MOLDS in LESS TIME. Compare them, point for point, with any other Jolt Squeezers on the market.

New Bulletin No. 118

Just off the press. Gives complete description and specifications of Milwaukee Jolt Squeezers. Send for your copy.

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(*Continued from page* 158)

instructor is charged with the responsibility of seeing that no item of instruction which has been approved is left out. He may not use the exact terms in the outline but may adjust his presentation to the understanding ability of the learner. In fact, it has been found that after a few weeks the instructor rarely needs to refer to the outline except to check himself to see that all necessary information has been given.

When training material has been completed for a department or unit, the foreman calls all the people concerned into a meeting and a complete explanation of training plans is outlined. The foreman announces the appointment of the instructor and gives a careful explanation of his duties. By offering training as a service and soliciting the help of the people to be trained, there is usually enthusiasm and interest from the beginning. The operators are told to call upon the instructor if he can be of service and he makes no effort to confine his attention to any certain individuals during the first few days. By starting in this manner, the instructor is accepted voluntarily and has an opportunity to become acquainted with the group before he starts giving attention to designated individuals.

Foreman Calls Men Together

Certain information can be given by group training with a saving of time and with as much effectiveness as if it were on the individual basis. In the early stages of the application of training, the foreman will call his men together and cover many of the matters which apply to the group as a whole and which can be put over verbally. In these sessions, much of the related knowledge, the effect of the work of the department on subsequent operations, quality requirements and many similar subjects can be adequately covered. Specimens of good work and of inferior work are often brought into these meetings for use as illustrations of requirements. As a part of these meetings all employees in attendance are urged to ask questions and make suggestions for improvements in the department.

These meetings are well planned to insure that time will be used properly and that important points are covered. The training staff assists in making the outlines but has no part in running the meeting. A foreman may plead inability to talk before a group of people but with an outline to help him he usually does an excellent job. Since he does make a good presentation and has committed himself on what he thinks should be done, he usually goes straightway back to his department and starts making good on his commitments.

Since our instruction outlines list each item involved in any trade or job, they also furnish a means of checking the items on which the learner has become proficient. A weekly progress report is made on each trainee which shows those items involved in the work he has done. When the instructor is confident that he has demonstrated ability to perform a particular item and will be able to apply the knowledge in future similar jobs, the item is checked off on his record as having been learned. The employee's training record will show at all times the features of the work on which he has qualified. When he has successfully performed all the items on the outline, he is qualified to do the work with normal supervision but he may not be certified

Pioneer User of Cast Aluminum Cited

EMPLOYED by the Griswold Mfg. Co., Erie, Pa., since April 15, 1894, and nationally known as the first woman to boil water in a cast aluminum teakettle, Miss Etta Moses has been awarded the 50-year service pin by the American Foundrymen's Association.

Ely Griswold, company president, and co-workers gathered recently for the presentation to "Aunt Ellen," as she is affectionately called, and to reminisce on the firm's growth from a garage-like size to its present proportions. A 40-year-old cast aluminum teakettle, repolished, was used by Miss Moses to demonstrate to newspapermen, as shown above, the significant act of nearly 50 years ago when she was asked to boil water in one of the first pieces of cast aluminum kitchen ware ever produced.

An aluminum teakettle was instrumental in inducing the Griswold company to enter the aluminum castings business in the 1890's when Charles Hall and Arthur Davis, pioneers in the aluminum field, demonstrated to the late Matthew Griswold Sr. the usefulness of the metal in kitchenware form. Both Miss Moses and Mr. Griswold are portrayed in the Aluminum Co. of America's movie, "Unfinished Rainbows," which describes the development of the aluminum industry.

Miss Moses now works in the personnel section of the plant. She began at Griswold, as she puts it, "as a Stenographer, which I always spell with a capital 'S'," and at one time was the only woman employed. Her correspondence duties include the giving of advice on the uses of Griswold products, and she has sent out countless recipes. Once she developed friendly correspondence with an Eskimo friend family following a query about aluminum ware. Griswold officials believe "Aunt Ellen" to be the only woman identified with the industry for such a long time.

as fully trained without further study.

Since the measure of the ability of such workmen as molders and coremakers is found in individual production and scrap casting records, these records must also be used to measure the effectiveness of training. Concurrently with records of items of work satisfactorily performed, a record is kept of the trainee's production and losses. His scrap work then becomes the key to further training needs, and a detailed analysis of the causes of his failures indicates the points on which he needs assistance. When his percentage of losses is held to a predetermined figure and he has met production standards for a sufficient length of time, he is presented with a certificate which indicates that he has successfully completed his training.

By compiling graphs on past performance of learners who have not been trained under the present plan, and similar graphs on present learners, we are able to determine the effectiveness of our methods.

Certain Principles Necessary

While our experience in extensive job training covers a short period and we are still asking more questions than we are giving answers on the subject we believe that certain principles are necessary for the successful conduct of this type of training. One of these is that training should be directed to fulfill a specific need, and that the points at which greatest needs exist can be readily located. Some indications of these needs are low production, high scrap loss, excessive labor turnover, a poor safety record, low morale and anything which contributes to excessive costs and unsatisfactory conditions. We believe that training material can best be devised on the job and adapted to local conditions. The type of training which remains academic in character sometimes fails to get around to showing a savings in the cost statements.

Many text books and package training courses may be very valuable if interpreted and adapted to local conditions but they are likely to remain in the "religious on Sunday" classification unless some one is given the responsibility to help bridge the gap between the book and the job. The average foreman will benefit little by being handed a copy of labor laws or a treatise on applied psychology. The things he must know for the successful performance of his duties can be reduced to simple terms and illustrated by application to the local situation.

Whatever the investment in a training program may be, the cost should be compared to that of training without a plan. We have always had training to do, and we have done it by some means, in some length of time and at some figure in cost. This cost has been reflected in excessive turnover, absenteeism, scrap work, personal injuries and extra supervision to shoot trouble caused by insufficiently trained people.

By setting ourselves a task to instruct in such a manner that the learner is brought to the point of profitable production in the shortest possible time we should be able to determine the true costs of training and at the same time bring a greater measure of satisfaction to people through their pride in the ability to do a job well.

MAGNESIUM FOUNDRY CORE PRACTICE

(*Continued from page* 77)

325 F for a period of time which is adequate to drive off excess moisture. A small quantity of tempering water chemically combines with the urea formaldehyde. After the excess water is driven from a core, the sand grains are bonded together by the resin.

An important factor in controlling the bonding properties of urea formaldehyde resins is the pH content of the sand mix. A prepared resin-sand which has a pH of more than 7 cures slowly, and ultimately may produce weak cores at standard baking times and temperatures. When too acidic a condition prevails (pH less than 4) condensation of the resin is accelerated, and the effective life of mixed sand is curtailed appreciably. For general practice the most satisfactory pH range is apparently 5 to 6. With the use of inhibitors like boric acid, a satisfactory pH adjustment is often made by the addition of small quantities of fly ash to the sand mix, as pointed out by Gebhardt[4].

As with any new development, the introduction of synthetic resins to core practice was accompanied by problems which the resourceful foundryman ultimately solved. The tendency for sand to stick in core boxes was a difficulty faced by early resin users. This factor has been largely overcome by the addition of small quantities of fly ash, fuel oil or kerosene to the sand mix. In some instances, materials other than than those listed have been used successfully. It is interesting to note that one manufacturer is marketing a modified urea formaldehyde core binder which is compounded to minimize or eliminate stickiness during core making[5].

In addition to possessing low retained strengths, resin-bonded cores are highly collapsible, by virtue of low hot strengths. This important characteristic has decreased the incidence of hot tears, caused previously by the use of relatively non-collapsible cores.

Since resin-bonded cores are baked at 325 F, many foundries successfully incorporated the necessary inhibitors in sand mixes and eliminated the spraying of cores. General practice in this respect is predicated upon the use of approximately 0.5 per cent sulphur and 0.3-0.5 per cent boric acid in the sand. When exceptionally heavy casting surfaces are encountered, core sprays are used occasionally, as dictated by casting results.

Resin-sands, when properly prepared and used, produce cores of excellent definition, and suitable baked properties.

Low Baking Core Oils — Concurrent with the introduction of synthetic resins as core binders, core oil manufacturers entered into research programs from which emerged a series of core oils capable of being baked at 360-375 F. Such oils are popularly termed either low temperature or low baking core oils.

Detailed Information Lacking

Little or no detailed information is available regarding the exact compositions of core oils. Conventional oils, which require baking temperatures of 425-450 F, are generally baked on the use of generous quantities of "drying type" oils. Cores made with this class of oils are dependent upon the presence of considerable oxygen during the baking cycle for the development of bonding properties. Low baking oils are based primarily upon relatively low temperatures, polymerizing, oil components. In general, these oils are not as dependent upon oxygen during core baking as are the drying type of core oils.

Both types of oils mentioned contain suitable solvents to lower the viscosity of the base materials, so that good distribution may be attained during the sand mixing operation. The same fundamental steps are followed during baking, in cores made from either class of oil. Upon entering a baking oven, a core commences to lose moisture rapidly. As the temperature of the core is raised, the volatile components of the core oil are driven off. Finally, oxidation and/or polymerization occurs, with a resultant development of bond in the core.

With the use of low baking core oils, inhibiting agents can be added to the sand mix, eliminating sprays on almost all work. As discussed priviously, however, sprays may be required to protect extremely heavy casting sections.

Cores made with most low tempera-

(*Continued on page* 164)

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(*Continued from page* 162)

ture oils exhibit lower retained and hot strengths than cores bonded with conventional oils. Although inhibitors have an effect upon both retained and hot strengths of cores, their influence on these important properties is secondary to the type of core binder employed. It is interesting to note that cores bonded with synthetic resins can be removed from castings more readily than cores made with low temperature oils.

The tensile strength vs. baking time curves for an Ottawa sand bonded with a conventional core oil, is shown in Fig. 1. From the curves, it is apparent that a baking temperature of 375 F is inadequate. Fig. 2 illustrates the characteristics of low baking oil specimens. Note how rapidly the bond deteriorates at a baking temperature of 450 F.

The development of low temperature core oils must be considered as an important contribution to magnesium foundry practice, since these oils are superior to conventional types in light metal founding.

Inhibitors — Although Beck[6] states that sulphur and boric acid are the best inhibitors for use in magnesium foundry sand practice, the adverse effects of boric acid on oil bonded core sand properties stimulated a search for other inhibiting agents. The effectiveness of boric acid in preventing oxidation of magnesium alloys cannot be questioned, especially when it is used in conjunction with sulphur. An understanding of some of the problems faced by foundrymen using boric acid in oil bonded cores and a study the thermal characteristics of boric acid are necessary to appreciate the work done with other inhibitors.

The reader should bear in mind that inhibitor practice with resin bonded cores is based upon the use of sulphur and boric acid. The primary difficulties experienced with boric acid occur with oil bonded cores, and not to any extent with synthetic resins. This factor is probably explained by the excellent waterproofing properties of urea formaldehyde resins. This entire discussion relates, therefore, to inhibitors used with oil bonded cores.

When a core containing boric acid is baked, the following chemical changes take place: Upon heating boric acid to 210 F, water is evolved and metaboric acid is formed. H_2BO_3 (210 F) $\rightleftharpoons$ $HBO_2 + H_2O$

Upon additional heating to approximately 300 F, another molecule of water is given off, accompanied by the formation of tetraboric acid. $4HBO_2$ (300 F) $\rightleftharpoons H_2B_4O_7 + H_2O$.

At a temperature much higher than is experienced in core baking, the tetraboric acid breaks down to form boron oxide, B_2O_3, and water.

In the first reaction at 210 F, the loss in weight due to the evolved water is 29 per cent, while at 300 F there is an additional 10.3 per cent loss. These reactions are reversible, in that the entire quantity of water is slowly reabsorbed from the atmosphere at room temperature. Baked cores containing boric acid will absorb considerable moisture upon storage in humid summer atmospheres. As a result, two important qualities of cores are affected:

1. Physical properties decrease considerably.
2. Distortion and general instability occur.

In the manufacture of aircraft engine castings, dimensional stability of cores is a factor which is of paramount importance. Distortion and cracking can occur to cores containing as little as 0.3 per cent boric acid, upon exposure to normal summer atmospheres, in from four to five days.

During the war, several foundries were confronted with the necessity of thermally reclaiming core sands. Since boron oxide could not be removed from sands by thermal methods, these foundries had an additional reason for seeking a volatile inhibitor as a replacement for boric acid.

Potassium Fluoborate — The research work performed on core sand inhibitors was based not only on the shortcomings of boric acid, but also upon the elimination of protective sprays. Curtis[7] described in detail his work with potassium fluoborate as an inhibitor to replace boric acid in core sands. This fluoborate, when used in quantities of from 0.5-0.6 per cent, in conjunction with 1 per cent sulphur, showed remarkably good inhibiting qualities against metal sections up to 2½ in. in thickness. By virtue of its exceedingly low solubility (Table I) in water at room temperature, potassium fluoborate does not impair either the workability or green strength of cores. The baked tensile strength of cores made with this inhibitor is somewhat greater than the baked strength of cores made without any inhibitor, and considerably greater than the strength of "boric acid cores."

Although the decomposition tempera-

(*Continued on page* 166)

Cleaning Large Castings Hydraulically

By H. B. McDERMID

A DISCARDED boring mill and a hydraulic jet have been employed by a builder of large power plant machinery to solve what had been a troublesome problem on cleaning runner castings for hydraulic turbines. These castings, involving considerable tonnage, formerly were cleaned by hand—an operation that was too time consuming and which often produced an unsatisfactory looking casting.

In studying the problem the plant engineer located in the shop a worn-out boring mill that was about to be discarded. Deciding he could use the tool in the runner cleaning operation, he salvaged the lower part of the mill, including the table and driving mechanism. He then made a large concrete-lined pit in the foundry yard within reach of a traveling crane, and in the pit he placed the stripped boring mill together with its driving motor. On the edge of the pit, with its suction line dipping into a large sump, he installed a high-pressure centrifugal pump and an anchored but movable control nozzle, which could be handled by one man as he stood behind a steel shield and watched the work through small peep holes.

Arrangements were made to catch the core sand as water from the casting returned to the sump; the sand then could be picked up by a clamshell bucket attached to the crane and returned to the foundry for further use.

Setting a runner casting just dragged from the mold on the boring mill platen, and filling the sump with water, the device was ready for operation. The platen was started to revolve slowly, and water at 300 psi was played from the nozzle on the mass of casting and entrapped core sand. In a few minutes the turbine runner was cleaned and ready for the machine shop except for a little final chipping and the removal of core reinforcing rods. The latter operation was simple once the sand had been eliminated.

In operation, the casting can be revolved continuously or only a few degrees as needed, making the setup adaptable to any fairly large casting. The arrangement appears satisfactory for any casting with sufficient weight to hold it on the revolving table under the impact of the water's high pressure.

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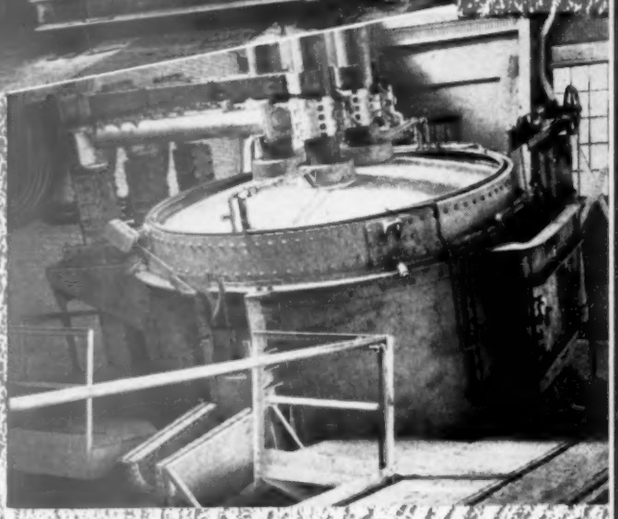

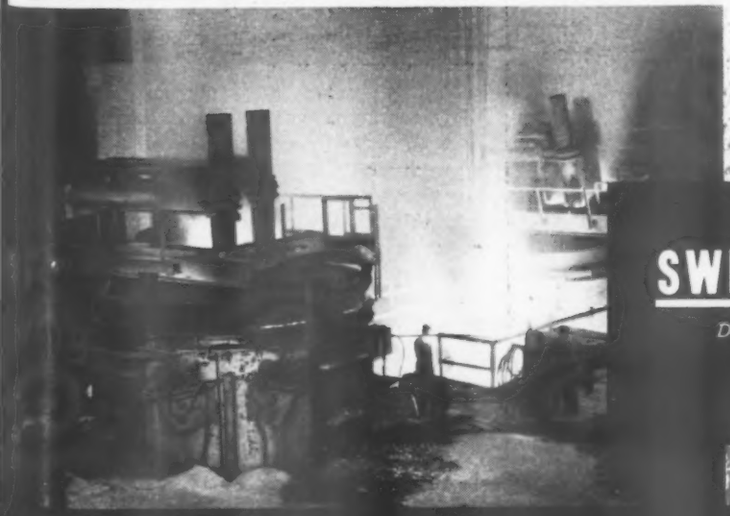

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COMBS GYRATORY FOUNDRY RIDDLES

(*Continued from page* 164)

ture of potassium fluoborate is high (Table II), the baking temperature of cores containing this salt and sulphur is relatively critical. Baking temperatures in excess of 375 F (using low baking oil) are undesirable because of the high potential sulphur loss which may occur. Thermal reclamation of core sands containing potassium fluoborate is not possible with available types of equipment, because of the slow decomposition rate of this fluoborate. Since this salt is not very soluble in water at room temperature, it does not appreciably alter the pH content of a sand mix. For this reason, potassium fluoborate can be utilized in conjunction with synthetic resin binders.

The development of potassium fluoborate as a core sand inhibitor is significant, for cores incorporating both this material and sulphur, have good physical properties, dimensional stability, and in general do not require protective sprays.

Ammonium Fluoborate — During the war, the foundry with which the writer was associated was faced with the problem of core distortion, and the necessity of thermally reclaiming core sands. To satisfactorily eliminate the first difficulty, and accomplish the second task, it was imperative to substitute a suitable, volatile inhibitor for boric acid. Among the volatile fluoride salts tested, ammonium fluoborate seemed to be the most promising. Subsequent development work showed that this salt, which is commonly used in a protective core spray, could be successfully incorporated in low temperature oil bonded cores, which were baked at 360-375 F.

Adequate protection against the oxidation of magnesium is afforded by the use of approximately 0.4 per cent ammonium fluoborate and 0.6 per cent sulphur in core sand mixes. This fluoborate causes a slight decrease in green strength, and impairs the workability of green sand to a small degree. In order to decrease the tendency of this type of sand to stick to metal equipment, a small quantity of kerosene is added to the sand mix.

The advantages of ammonium fluoborate by far outweigh the disadvantages mentioned. Cores made with this salt have higher baked properties than boric acid type cores. In addition, cores containing ammonium fluoborate may be stored for days in normal summer atmospheres, without any noticeable effect upon dimensional stability. Since this salt sublimes at 446 F, core sands made with this inhibitor are easily reclaimed by available thermal methods. However, decomposition slowly begins at temperatures below 446 F (Table III), and for this reason maximum core baking

(*Continued on page* 168)

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(*Continued from page* 166)

temperatures are somewhat critical. With the use of low temperature core oils, baking temperatures in excess of 375 F may cause a total loss of inhibitors sufficient to permit burning in the mold.

Although ammonium fluoborate offers instantaneous protection to molten magnesium, the presence of sulphur is necessary, for the fluoborate, in quantities up to 0.4 per cent, cannot completely inhibit oxidation, when used alone. It is of interest to note that cores containing sulphur and ammonium fluoborate do not require protected sprays, in the manufacture of aircraft engine castings.

Ammonium fluoborate apparently cannot be used in synthetic resin cores, because of the adverse effects of the salt upon the resin.

In his work with fluorides, Curtis noted that ammonium fluoborate had a serious effect upon baked core properties, even to the extent of producing friable core surfaces. Our data do not corroborate this information. It is believed that the difference in results is due mainly to our use of low temperature core oils, in conjunction with ammonium fluoborate.

Summary — The trend of these developments is aimed specifically at lowering the cost per casting, by achieving one or more of the following:

1. Reduction of both core and casting scrap.
2. Decrease in baking temperature and/or baking cycle of cores.
3. Reduction of direct labor costs.
4. Decrease in casting cleaning costs.

The selection of core binders and inhibitors by a foundry must be based upon the equipment and facilities available in relation to production schedules and the size of cores and castings to be made. For these reasons, which are fundamentally economic, core binder and inhibitor practice vary from one foundry to another. These developments in magnesium core sand practices, coupled with the numerous advances made in general foundry practice, indicate that the magnesium foundry industry will be in a favorable competitive position during the ensuing postwar years.

The author wishes to thank the General Chemical Co. for permission to publish the chemical and thermal characteristics of potassium and ammonium fluoborate.

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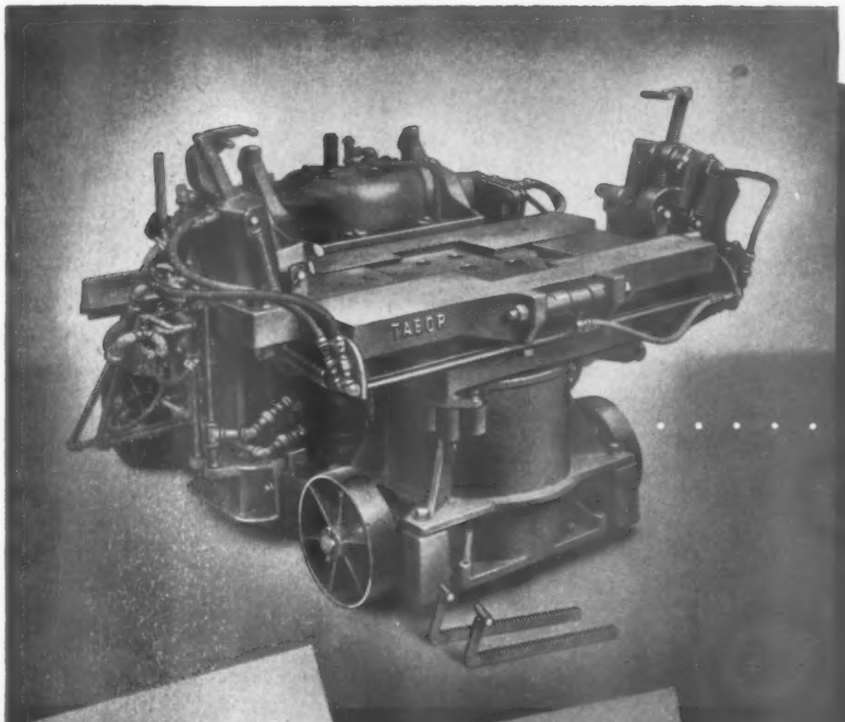

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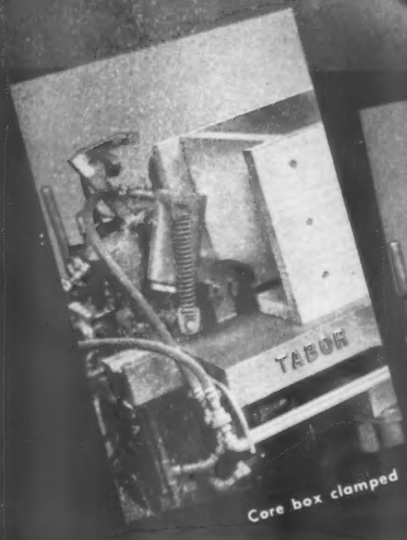

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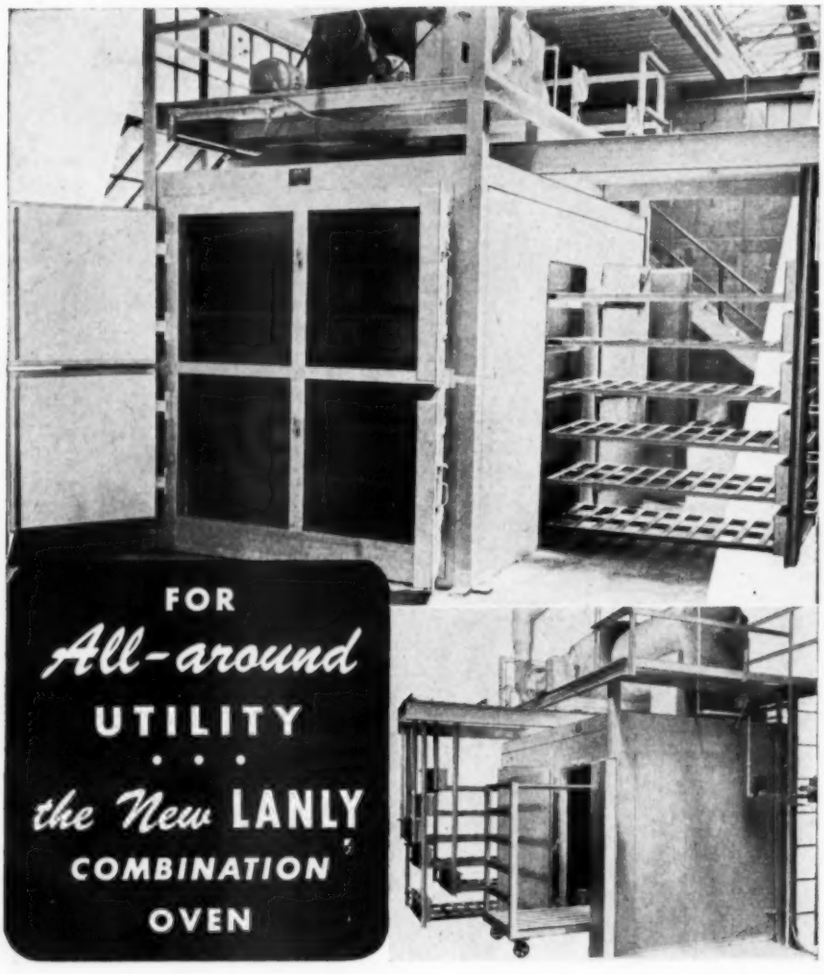

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(*Concluded from page 168*)

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Editor's Note: Since preparing this article the author has become associated with the Castalloy Co. Inc., 363 Third St., Cambridge, Mass., as assistant foundry superintendent.

Fire Losses During War Small

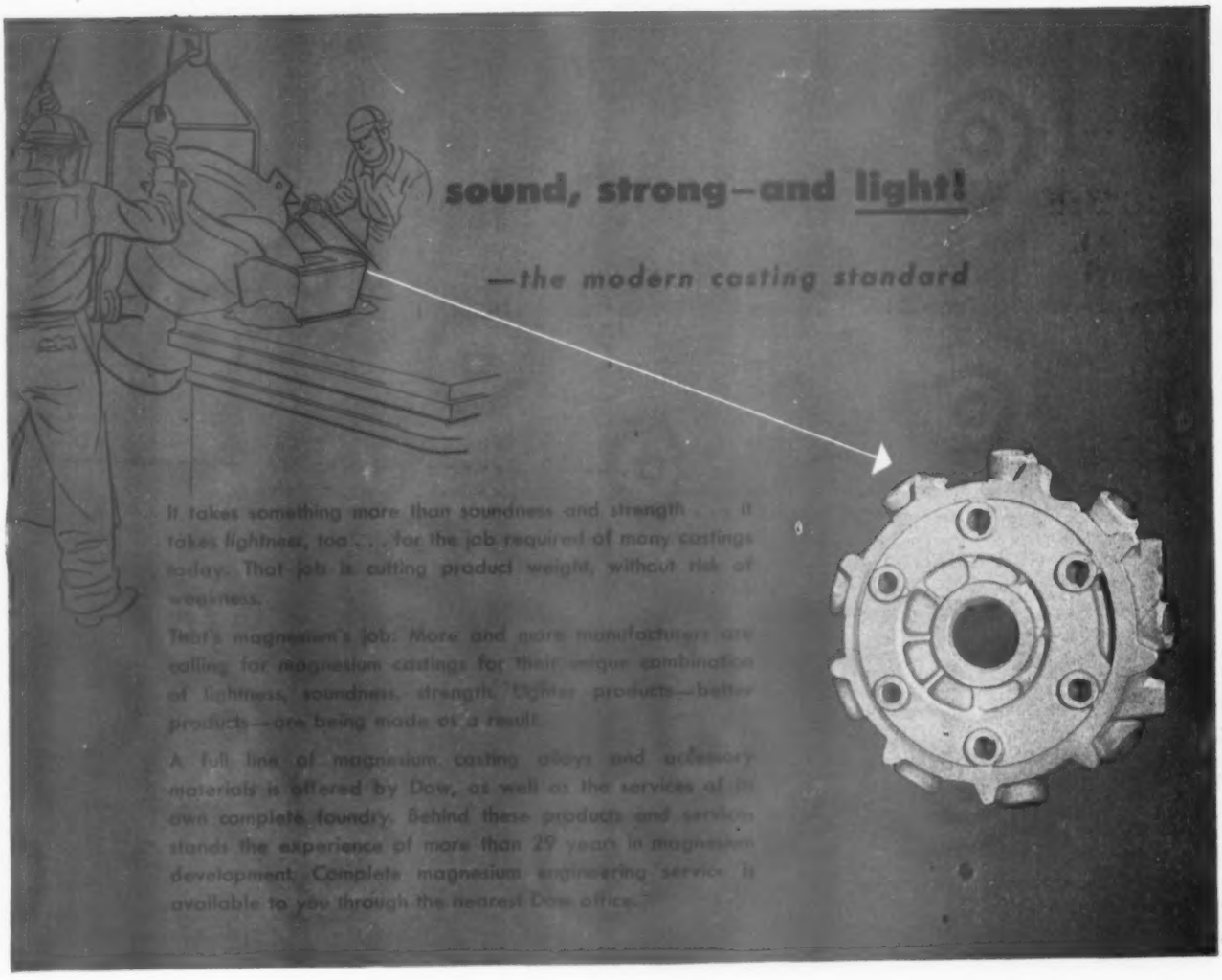
Organized fire prevention work by cooperation of civilian fire protection engineers and the armed services during the war materially held down fire losses in military establishments and war plants, according to a booklet entitled, "Fires That Never Happened," issued by the National Board of Fire Underwriters. The booklet points out that fire destruction of army property in this country was approximately 50 per cent of that expected to be the normal loss of civilian property for equal values and 40 per cent less than in World War I.

Instrument Society To Hold Conference

Over 1500 instrument men and engineers are expected to attend the first National Instrument Conference and Exhibit of the Instrument Society of America at William Penn Hotel, Pittsburgh, Sept. 16-20. R. J. S. Pigott, general chairman of the conference, has arranged a program of fifteen sessions covering subjects pertinent to the instrument industry. Exhibit space has been reserved by many manufacturers.

More About Sand

Foundry Sands and Mold Materials Committee of the Northern California Chapter, AFA, has issued its annual report in a booklet entitled "The Man at the Muller." It points out the important part that the man mixing sand plays in control, and the value in instructing him properly in his work. Other topics discussed include effect of mulling on sands, general requirements of foundry sands, controlling sand properties, and typical molding, core and facing sand mixtures for steel, gray iron and nonferrous castings. Data also are given on the types of West Coast sands used.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A full line of magnesium casting alloys and accessory materials is offered by Dow, as well as the services of its own complete foundry. Behind these products and services stands the experience of more than 29 years in magnesium development. Complete magnesium engineering service is available to you through the nearest Dow office.

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MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

The Adventures of BILL

By PAT DWYER
Drawings by RICHEY

A FEW months ago before the schools closed for summer vacation, Bill and I attended a P.T.A. meeting, where a tall, angular lady with a highly refined and polished accent discussed "The Effects of Heredity, Environment and Early Impressions on the Development of a Child's Mind." She deplored the behavior of some parents who meet every innocent inquiry with a snarling "Oh, for heaven's sake, shut your trap." At the other extreme she did not hold with parents who told their children blood-chilling stories to keep them on the straight and narrow path. Bill was not impressed with the presentation.

"A fat lot she knows about raising kids," he said. "On a percentage basis for her performance I would allow her nothing for looks, about 10 points for a brave attempt to imitate the Hollywood accent, maybe 30 points for earnestness, and perhaps 30 points for her evident belief in her own infallibility. That leaves her still lacking 30 points, and I think that is a very good place to leave her. Did you ever hear the story of *Little Billy Hooty and The Fox*?"

"That was the first of many stories told me by my mother between the ages of six and ten. The implied lesson in the story, the inevitable penalty which accompanied disobedience to the commands of a parent, went in one ear and out the other. The only feature that impressed me was the cruel fate of little silly Billy. Big salt tears oozed out of my eyes and my sympathetic little heart ached with grief as keen and poignant as ever I experienced in adult years when I was forced to pass through the Valley under the shadow of the Rod. In the innocence of childhood I assumed that Billy was a little boy like myself. I had arrived at the mature age of ten before I realized that Billy was a young owl, and that the family name Hooty was based on the raucous squawk of the bird's theme song. However, all that was far away and long ago. I have not heard the story since my own children ceased pestering me for it as they grew up and learned to read. Would you regard me as impertinent if I asked what prompted you to resurrect young Master Hooty and throw him into the conversational mill?"

"Not at all, my boy. Not at all. Pleasure I assure you and—er—all that kind of thing. One of my grandsons, four years old, and as sharp a little lad as you might come across in a long day's march, picked me out for a pal while his father was bending his shoulder to the wheel of the old battle wagon in the South Pacific. When he does me the honor of paying me a visit, and after he grows tired of doing a bit of ground and lofty wrecking, he selects a certain book, climbs on my knee and graciously announces that he will be pleased to hear me read the story about *The Owl and the Fox*. He also claims that if he had been present with his tommy gun, the story would have had a different ending. Some unknown author with the grace of God in his heart, an understanding of little boys, and a nice degree of skill in the manipulation of words, knocked out quite a job. Just bend an ear in this direction:

There was an old fox lived under the rocks at the foot of a huge old tree, and of all the foxes that ever did live there was none as bad as he. His step was soft with his padded feet, but his claws were sharp beneath, and sharp were his eyes and sharp were his ears and sharp were his T-E-R-R-I-B-L-E T-E-E-T-H!

"Pause here while brave Michael directs attention to his eyes and ears and teeth."

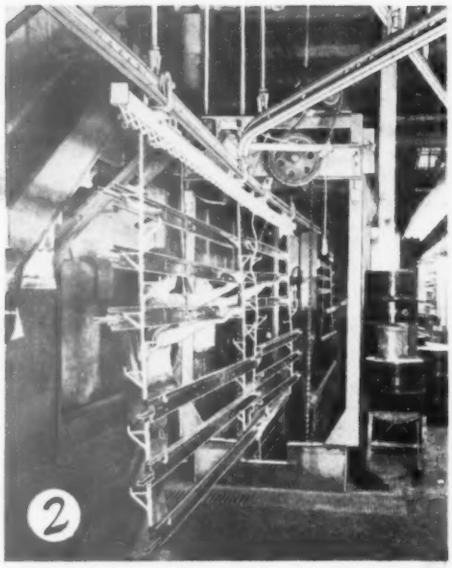
And the dreariest place you ever did see was this old fox's den. It was strewn with the down of the tender chick and the quills of the mother hen. When he dragged them in this dismal den and piled their bones together, and killed them dead, and sucked their blood and ate their flesh and picked their bones, and warmed his bed with their feathers.

"The boy gravely admitted that this fox fella was indeed a tough guy. Did I think he carried one or two guns? I had to regretfully admit that I did not think Bro Fox was familiar with, or skilled in the use of fire arms."

But while the old fox lived under the rocks as wicked as he could be, an owl built his nest in a very large hole that was up in the top of the tree. This owl was named Hooty and often at night,

(*Continued on page* 176)

The ordinary citizen wonders if a fox's tail is worth the cost of equipment, overhead, maintenance, time and energy



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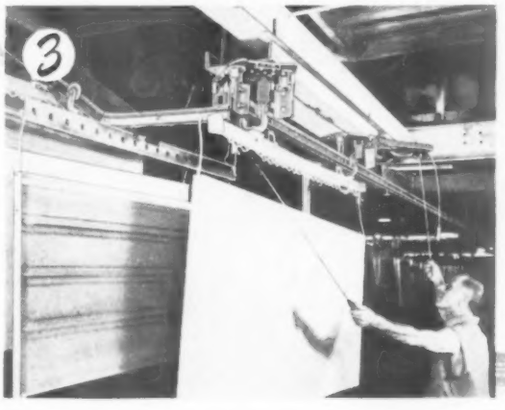

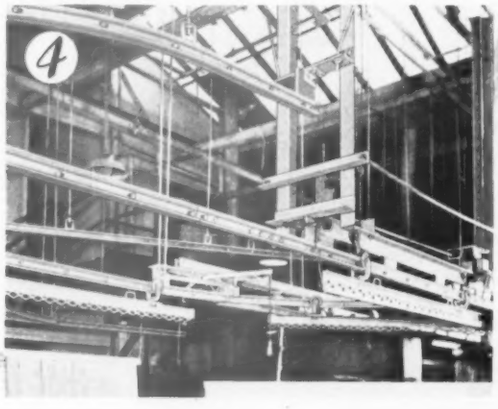

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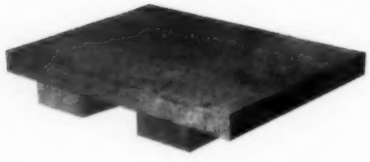

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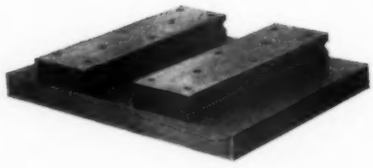

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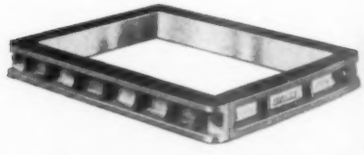

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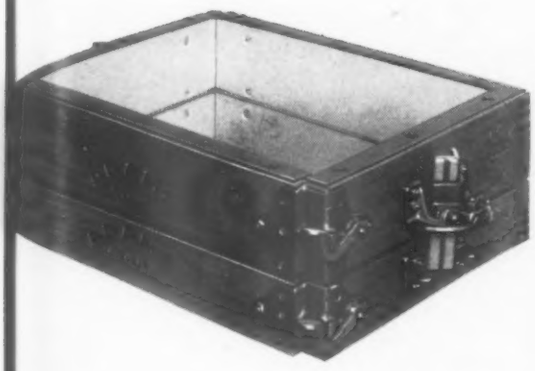
MOLDING MACHINES · FLASK EQ



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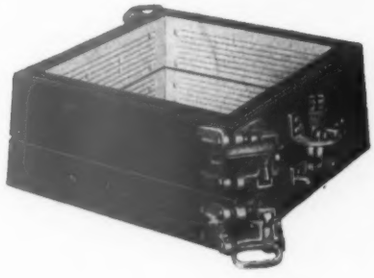

Steel Jackets
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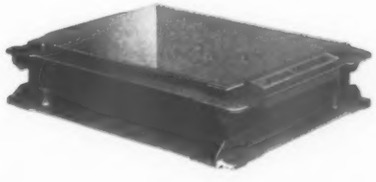

Descriptive literature on any of these items gladly furnished!

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METALLURGICAL APPARATUS

165 WEST WACKER DRIVE, CHICAGO 1, ILL.

(*Continued from page* 172)

when loudly the night wind blew, he waked the old fox in his hole in the rocks with his Whit-to-whit-to-whoo. Then the owl would laugh at the top of the tree to hear him wake and growl, for he hated the fox that lived down in the rocks, and the fox, he hated the owl.

"Time out here while our hero practiced the owl call. My mind raced back through time and space to a period between my twelfth and fifteenth year when I was reading the adventures of Henry Ware and his intrepid companions in the wild and Indian-infested Ohio territory. Separated in the woods for any reason, these young men invariably communicated with each other by cleverly imitating the call of the owl. Many an hour I spent up in the barn hayloft in emulation of Mr. Ware. On recent occasions, other members of the family showed a singular lack of enthusiasm at

Billy listens, but pays no attention

our owl call duet. His mother darkly suggested that if the young lad tried any of that 'owling' at home, she would give him something to 'owl about'. That's a joke, son; a regular 'owler'!"

Now the owl had a little son, Billy by name, and a beautiful owlet was he. His eyes were as big as the lamps of a gig and his bill was a wonder to see. He never cried when his head was combed, nor screamed when they wiped his nose, or washed his face and got soap in his eyes, and he never tore his clothes.

"My guest did not come out boldly and declare that while he was ready to believe almost anything, really there was a limit. Instead of a straight frontal attack, he executed a strategic flank movement by inquiring slyly 'How could they get any water up to the hole in the top of the tree?' That had me up a tree, until I had a flash of inspiration. I told him they had a water barrel outside the

(*Continued on page* 179)

Question? Answer!

¶ *What kind of bonding clay should I use in order to be sure of the highest green strength?*

¶ There's only one answer—DIXIE BOND. Some nine years' experience has proved that Dixie assures you of maximum green strength. You can count on high flowability and moderate dry strength, too. Those good qualities mean fewer cracked castings and less scrap, less jolting, and longer flask life. They minimize drops, swells, and cuts.

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¶ With five tried-and-tested bonding clays and many combinations to apply to your needs, ECP is in position to supply the one right answer to every situation, providing you the most bonding strength per dollar of your investment.

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Remember
NO ONE BONDING CLAY WILL DO ALL JOBS EQUALLY WELL!

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All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

Pattern Shop and Foundry EQUIPMENT

EKSTROM-CARLSON MILLING MACHINE

The Universal Milling machine made especially for the Pattern Industry. Two models, hand and power feed. Large capacity. Accurate.

FREEMAN MULTI-BLADE MIXER CORE SAND MIXER

Capacities from 3 cu. foot to 12 cu. foot. Choice of 3 drives and discharge locations. Ball Bearings. Replaceable Liners.

STRAND FLEXIBLE SHAFT MACHINES

Types for all requirements.

ROSS CORE DRAWER MAKES CORES TRUE TO SIZE

Increases production — Eliminates box repairs. Three models. Will draw boxes up to 16" high.

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Check Advantages for Cope and Drag Plates

Where weight or thickness of cast iron plates interfere with obtaining full capacity of your moulding machines, investigate Freeman DowMetal Plates. Eliminates machining, saves labor changing jobs and transporting from storage to moulding floor.

In stock for immediate shipment. 5/16" to 1" thick. Stronger and lighter than aluminum. Velvet finish, ready to mount patterns. Accurate. Held to parallel tolerance within .0025".

SHELLAC POTS

Annealed Glass — 1½ Qt. Capacity

MOULDER'S TOOLS

In stock — One piece forged tool steel

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PATTERN SHOP & FOUNDRY SUPPLIES & EQUIPMENT
MAHOGANY AND PINE PATTERN LUMBER

1152 East Broadway TOLEDO 5, OHIO Tel. TAylor 4624

(*Continued from page* 176)

house. The barrel was filled each time the rains came."

When Hooty was going he said to his son: 'Now, Bill, I command and beseech you, don't leave the nest, 'tis my earnest request, for the old fox may catch you and eat you. He is watching below to catch you I know, so don't try to fly till I teach you.' And poor little Billy was so very silly, he climbed out on the bough and the old fox laughed with a Ha-ha-ha and thought he had got him now. At last he heard a flutter of wings and Hooty lit on a tree and his screams were wild when he sought for his child, and Billy, no where was he. So he cast him down in his empty nest and covered his face with his wing and his sobs came from his speckled breast and he cried like anything. And he screamed so loud in his wrath and woe that he shook the huge old tree. And the old fox heard as he lay below and not a sign of sorrow did show, but laughed a He-he-he!

"At this point I always am told to hurry up and get to the place where the blood and fur begin to fly. The naughty old fox ate poor little Billy and richly deserves all that is coming to him. When Michael is old enough to understand such things I am going to tell him that the second part of the story does not gibe with my idea of justice.

The owl stopped crying and wiped his eyes and shook his fist at the fox, and said: 'You villain, you stole my child and carried him under the rocks. You've eaten my Billy, my pretty first born without an equal for beauty. But I'll tell Jack with his hounds and his horn, as sure as my name is Hooty. And the bow-wow dogs and the toot-toot horns and the galloping horse and Jack shall race you and chase you wherever they trace you and thunder along on your track. And I will think of my Billy that's dead as I flap along on the trail, to see the dogs bite off your cruel head and Jack ride away with your tail.'

"This is where the story flies off at a tangent. It starts off to show what happens to children who do not obey their parents. All plain and simple. Young Bill was told to sit tight and not stir out of the nest. A minute after his father left on a foraging expedition, which incidentally meant the death of some little innocent creature, brave Bill strutted out on a branch, lost his footing and fell to the ground where the fox pounced on him, dragged him into his den and gobbled him up. Logically, the story should end right there. The kid broke training and got what was coming to him. Instead of that we are told that the fox was a criminal and should be punished. My listener informed me that I could omit all the baloney. It was not in the story. He wanted to hear the part where the fox and the dogs put on the great battle and bit great big bloody hunks out of each other."

So in the morning out came Jack with his spurs on his heels and his whip to crack. And he saddled his horse and called his pack and started off on the fox's track. Away he went with the

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SIZES RANGING FROM 2 TO 600 CU. FT. DISPLACEMENT

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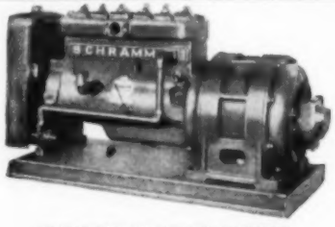
Built-in Motor Drive mounted on steel base is compact and easy to install. No foundations necessary.

WITH "V" GROOVE PULLEY

Schramm Belt Driven Compressors can be obtained with "V" or flat belt drive suitable for twenty-four hour service and economical operation.

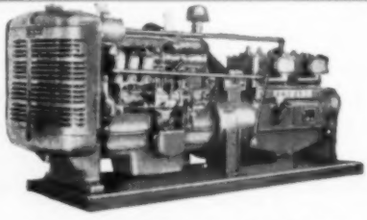


DIRECT MOTOR DRIVE WITH COOLING UNIT

Schramm 300 cu. ft. displacement with direct-connected 50 H.P. motor with cooling unit on Steel Deck Base.

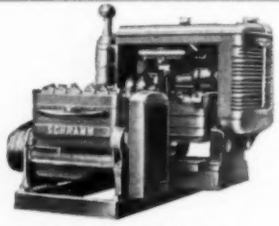
DIRECT DRIVE WITH STARTER AND RADIATOR

Both compressor and motor are mounted as a single unit on a substantial steel base with starter, radiator, and cooling unit.



DIESEL ENGINE DRIVE-IN LINE

Complete self-aligned, direct connected Diesel Engine Driven Compressor for semi-portable or stationary installation.



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Schramm Engine Belt Drive on Base combinations are available for applications not reached by electric power service in mill, mine, and other industrial plants.

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clattering sound of the swift-footed horse on the frosty ground. And the horns that rang with a merry sound and the deep mouthed bay of the rapid hound. With a toot-et-ee-toot and a toot-et-ee-toot, they made such a noise as on they flew, that the old fox did not know what to do. For the fox he listened and heard them come and dropped the duck he was carrying home. And ran through the wood as fast as he could and made for the den he had started from.

"Could Jack ride a horse as well as Gene Autrey, a hero he had seen at a recent rodeo? I assured him that Jack was a better man than Gene. He could ride a horse and blow a horn at the same time. Time out here while in a high, piercing voice he practiced the hunting call on an imaginary horn. Startled members of the family rushed in under the impression that I had him tied to a stake and was pulling his nails out with a pair of pliers."

The fox went skimming along the ground, but nearer he heard the bay of the hound. And on he went like the rushing wind (Long *i*, if you please) but the dogs came closer and closer behind. Till his legs were tired and his feet were sore and he found he could not run any more. Then he crept in a hole he chanced to see down at the foot of a hollow tree. But just as he thought he had ended the chase and was safe from the dogs in his hiding place, he heard old Hooty as down he flew and lit on the tree with a whit-to-who-o-oo. And the dogs came barking, glad to see that the fox was hid in the hollow tree. For there the fox was crouching beneath, arching his back and showing his teeth.

And his eyes were like sparks shining back in the dark, his tongue hanging out and gasping for breath, and froth on his lips, but game to the death. And he fought and fought the dogs till he died. He bit Growler's foot and cut Tray's side. They tore him to pieces—no mercy he begs, but some of the dogs limped home on three legs. And Jack came out and cut off his long gray tail and carried it home to hang on a nail. For that was the fox, so Jack could tell that ran so far and fought so well. And the owl looked down from the branch overhead, where the lifeless, tail-less fox lay dead. And laughed aloud as away he flew a whit-to-who, a whit-to-whoo-oo.

"A very handsome piece of work," I admitted. "I trust that the young man absorbed it and made a mental resolution to stick close to the old homestead in the future."

"Well," said Bill, "I'll tell you. He kinda ran me ragged at the end. How long was the fox's tail? How was it fastened on? Had I ever seen a fox? And at least 47 others that taxed the old imagination pretty well to the limit. Finally he ran out of comment. I drew a sigh of relief and expected him to jump off my lap and start another general wrecking expedition. He wiggled himself into a more comfortable position. 'Gee,' says he, 'that was a swell story Gramp. Tell it to me again!' "

DUST INC.
MONTHLY STATEMENT
Lowered efficiency of workers.....$?
Deterioration of machinery and equipment.....$?
Inferior quality of output.....$?
Downtime and cost of machinery repairs.....$?
Total.....$?

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If your dust control equipment is anything less than 100% adequate, it's costing you plenty in lowered worker efficiency, in over-rapid deterioration of machinery, and in many other ways.

You can rid your business of this serious cost burden . . . clear out harmful dust in your plant and keep it out . . . with an efficient, economical Dust Control System planned, designed, and installed by Kirk & Blum.

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WAR-TIME CRUCIBLE INCREASES

The past five years have brought an amazing increase in the preference for Crucible melting. Witness:

During the war years crucible furnace installations increased from 2455 plants to 2771 (13%); crucible furnaces grew in numbers from 9633 to 13,981 (45%); melting capacity per charge from 2,693,704 lbs. jumped to 4,976,305 lbs., a clear net gain of 85%. The point is, Melters buy more and bigger Crucible furnaces when expanding capacity.

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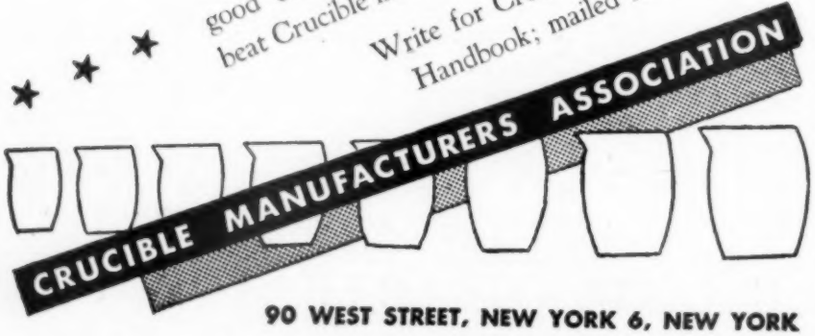

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NAVY YARD REVAMPS FOUNDRY

(*Continued from page* 82)

vention of the American Foundrymen's Association in Chicago by S. W. Brinson, master molder and J. A. Duma, metallurgist, Norfolk Navy Yard. The paper is incorporated in the *Transactions* of the association, Vol 48, pp. 225-282. This feature will be touched upon more in detail in Part II of this article to be presented in a future issue.

The sand handling and sand preparation system installed under the recent modernization program includes storage bins for 390 tons of sand, four muller type mixing units, a 48 x 72 in. shakeout in the brass foundry; a 144 x 192 in. shakeout with a lifting capacity of 50 tons in the iron and steel foundry; a sand distributing system; overhead storage hoppers; core sand skip hoist; flask filler bins with apron feeders; a dust collection system; gravity type roller conveyors and mold transfer car. Each of the mixing units has a capacity of 15 tons of sand per hour.

Castings are cleaned in a chamber, 25 x 25 ft, where a stream of water, 150 gpm and at a pressure of 400 psi, quickly removes all sand from inside and outside the casting or castings loaded on a 12 ft diam turntable mounted on an electrically driven work car. Sand and water fall into a tank, from which the sand is removed by a chain-driven slat conveyor which discharges over the end into a steel container. New sand is cheap and plentiful in the district and for the present the containers of wet sand are trucked into the foundry yard and dumped. Eventually this sand may be incorporated in the general supply of backing sand. Additional cleaning equipment includes a device in which abrasive material is automatically discharged centrifugally and at high speed against the castings, also four chambers, one 19 x 25 ft, one 10 x 17 ft, and two 7½ x 8 ft, in which an operator directs a stream of abrasive material through a hose nozzle. The 19 x 25 ft room is served by an electrically-driven car, 9 x 12 ft.

Two new swing grinders were added to those already in existence on the section of the floor near the north end of the building. Gates, risers and sprues on nonferrous castings are removed with band saws or abrasive disks and then are passed on roller conveyors to the grinding wheels or chipping benches. Large gates and risers on iron and steel castings are knocked or burned off, and then the castings are finished on stationary or swing type grinding wheels.

Six propane-gas-fired furnaces are

(*Concluded on page* 184)

BIG! ... BUT NOT TOO BIG TO BE A BUFFALO PRECISION PATTERN

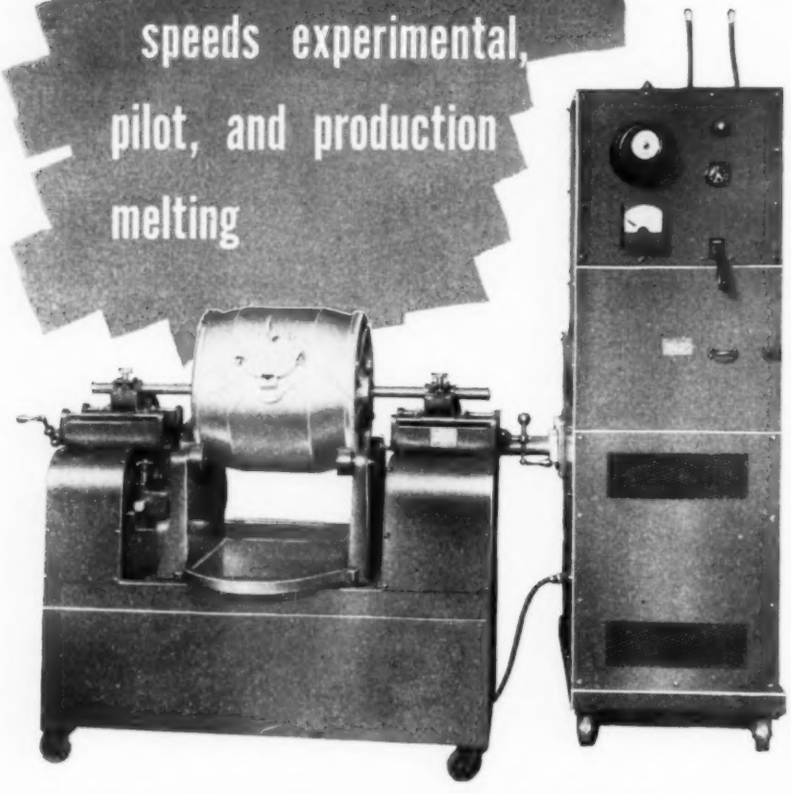
Look at the smooth machined surface of the pattern pictured above. Soon this big pattern — dimensionally accurate, machined to thousandths of an inch will produce low cost castings in volume for a leading manufacturer — with a minimum of scrap. Why not get the extra benefits of Buffalo's fifty years of "know how" with your next pattern regardless of size — no matter how intricate — write, wire, phone.

BUFFALO PATTERN WORKS

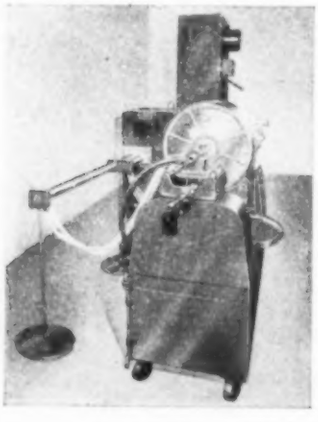
830 Hertel Avenue **Buffalo 16, New York**

VERSATILE DETROIT ELECTRIC FURNACE

speeds experimental, pilot, and production melting



The Detroit Rocking Electric Furnace, type GMS or GMSR 30 Kw., is a practical investment in profitable foundry operation, because it is small enough for pilot and experimental work, yet fast enough for production melting. Designed with a crock and cover lining which is available in alundum, magnesite, sillimanite, zircon, or carbon, either model is adapted for testing a large variety of alloys. Spare interchangeable shells may be used if different refractory linings are necessary. In production work, the relatively small cold charge capacity of 60 lbs. and molten iron capacity of 100 lbs. are more than compensated for by the speed and positive control which enables these furnaces to melt 600 lbs. of iron or 800 lbs. of brass in one 8-hour day. Send us facts about your melting requirements. Our engineers will show you how the type GMS, GMSR, or other type Detroit Rocking Electric Furnaces can increase quality production in your foundry at low cost.



Side and front views of Type GMS Detroit Electric Furnace showing simplicity of power connections, improved manual electrode control, transformer primary knife switch, and meter panel.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Concluded from page* 182)

available for various types of heat treating the iron and steel castings: One 4 ft square; two 8 x 3½ x 3½ ft; one 4 x 8 x 12 ft, capacity 15 tons; one 6 x 9 x 15 ft, capacity 20 tons; and one 10 x 15 x 28 ft, converted from oil to propane gas during the modernization program.

Propane gas piped through portable burners is employed for raising the temperature of the ladle linings to a bright red before the ladles are filled with metal. In the large ladles the burner is inserted through a hole in the cover. The small ladles are placed in an inverted position over a number of openings in the roof of a long, brick-lined chamber. Iron and nonferrous metals are poured over the ladle lip. Steel is poured through a nozzle opening in the bottom of a ladle suspended from one of the cranes.

Ladle stoppers are dried in a plain, box oven designed and built by the shipyard personnel. The stoppers are assembled in the vicinity and then, to a total number of 24, are suspended by the upper end of the stopper rod from suitable devices in the roof. After they are dried, the stoppers are stored in the oven until they are needed. Under this arrangement an ample supply of properly prepared and dried stoppers always is available.

All welding repairs are concentrated in one area equipped with six revolving tables. Castings up to 2 tons in weight are placed on these tables by the crane. Large castings up to 10 tons in weight are loaded by the crane on a transfer car, which carries them into the welding department. Permission to weld any defective area is granted only after a thorough examination by duly qualified authority and usually is confined to minor defects that do not affect the general utility of the casting.

Facilities for producing castings by the centrifugal method are provided by two machines. The vertical type machine can handle castings up to 30-in. diameter. Castings up to 24 in. diameter and 10 ft in length are made in the horizontal type machine. Molds for use on these machines, whether for ferrous or nonferrous castings, are sand lined.

Sand testing and control and all metallurgical process are under constant control in a new sand and metal laboratory. Equipment for x-ray magnaflux and radiographic inspection is available, also hydrostatic pressure testing equipment. A modern foundry organization includes a foundry engineer, sand engineer, metallurgist and planning committee. Flexible layout permits use of the foundry either as a straight line production, or a general jobbing unit.

(*To be concluded next month*)

MELTRITE

More used than any other merchant pig iron...

P M

PICKANDS MATHER & CO.

CLEVELAND • CHICAGO • DETROIT
ST. LOUIS • ERIE • DULUTH
MINNEAPOLIS • TOLEDO

IRON ORE • PIG IRON
COAL • COKE

Such Preference MUST BE MERITED!

Industry BRIEFS

G W. VANDERVORT CO., Portsmouth, O., plans immediate construction of a new gray iron foundry for the production of soil pipe. The plant will be completely mechanized and is expected to be in production the first of next year. Full operations will require more than 300 employees. F. G. Wade Inc., Cleveland, is technical advisor for the project, which represents a $1,000,000 expansion for the company.

• • •

Finkelstein Foundry & Supply Co., 9901 South Alameda St., Los Angeles, has obtained a permit for construction of a steel building to cost $4500.

• • •

Lohrville Foundry, Lohrville, Wis., producer of gray iron castings, has been sold to the Calhoun Machine Co., Calhoun, Wis.

• • •

Conlon Corp., Chicago, has reorganized the executive staff of the recently acquired Moore Corp., Joliet, Ill. which is being operated as a separate unit. Harry T. Worthington has been named vice president and general manager; John M. Foxx, vice president in charge of sales; and Orville E. Oesterele, formerly associated with Florence Stove Co., is general factory superintendent.

• • •

Chemalloy Foundry, Louisiana, Mo., is being incorporated by the present owner, Jim Maddern, and Bert Schuessel and Charles Broz. The three men were former partners in the National Foundry & Machine Co., St. Louis. The plant, started about a year ago from the old National Youth Administration Foundry, has been making aluminum castings and will add brass foundry work. Two additions are planned to the foundry, one 24 x 50 ft and the other 24 x 60 ft.

• • •

Okaw Foundry & Mfg. Co., Arcola, Ill., has been sold by Paul Edgell to Wayne A. Jackson and B. C. Cook, both of Mt. Vernon, Ill. Mr. Edgell started the foundry last December.

• • •

Farnes & Martig Inc., 417 N. E. Couch St., Portland 14, Oreg., has been appointed sales and service representatives of Wheelco Instruments Co., Chicago, for the state of Oregon.

• • •

Lakey Foundry & Machine Co., Muskegon, Mich., has nearly completed its $875,000 expansion and modernization program undertaken after V-J Day to cut operating costs and enlarge production capacity.

• • •

Baltimore Castings Corp., 4500 East Lombard St., Baltimore 24, has acquired a major section of the former plant of the Maryland Sanitary Mfg. Corp. from War Assets Corp. It is being converted to a gray iron foundry. Cast iron soil pipe and fittings, and at a later date, general gray iron castings will be made. Plant is equipped to produce brass and aluminum castings, but no immediate production is contemplated. Officers are: R. D. Watson, president; Henry K. McHarg, treasurer, and Frederick B. Warder, secretary.

• • •

S & W Corp. has purchased a steel casting plant at Bettendorf, Iowa, from War Assets Administration for $190,000 and will continue making gray iron and steel castings. The plant was operated during the war by Zimmerman Steel Castings Co., Bettendorf, Iowa.

• • •

Aircraft Salvage Corp., 4201 East Monument St., Baltimore, recently has been incorporated to dismantle war-weary airplanes, melt down the aluminum and dispose of the remaining parts. The recovered aluminum will be shipped to the local plant of the Tomke Aluminum Co. for refining.

• • •

E. Tex Reddick is constructing a 60 x 80 ft foundry building at Grays Mills, Wis. It will be equipped with modern foundry equipment which Mr. Reddick has in operation at a county fair grounds building until the new structure is completed.

• • •

The government steel casting and foundry facility at Lima, O., operated during the war by the Ohio Steel Foundry Co., West Fourth St., Lima, has been leased to that company by the government for 3 years at a minimum yearly rental of $50,000. Rolls for use in steel mills will be produced and production items of no peace-time value will be maintained on a standby basis.

• • •

Herco Co., 5335 Southern Ave., South Gate, Calif., has obtained a permit for construction of a new $60,000 foundry building at that address.

• • •

Charles R. Gregg, Alhambra, Calif., has obtained a permit for construction of an 80 x 180 ft steel foundry building costing $62,000 at 650 Hickson St., El Monte, Calif.

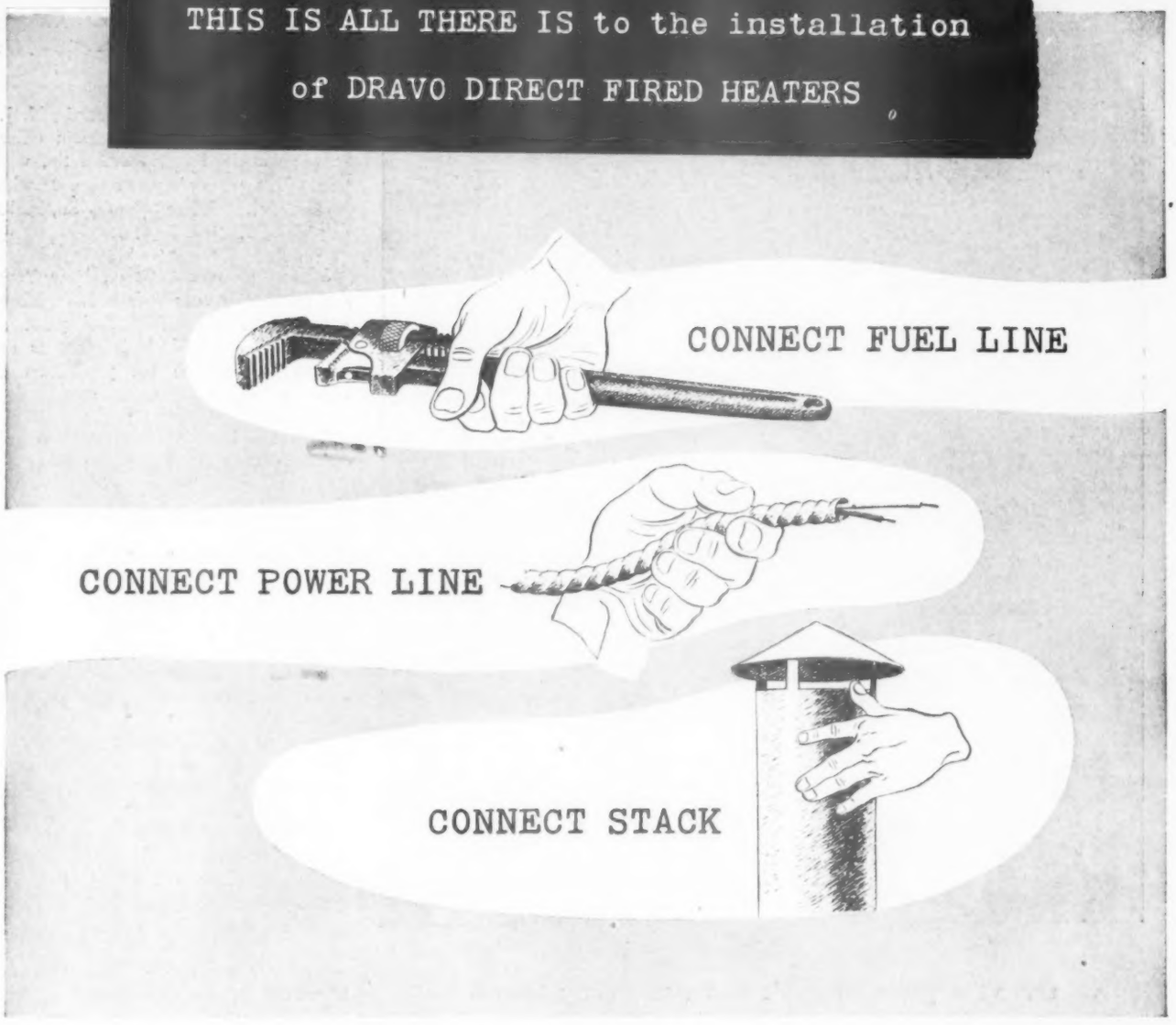
• • •

Sales of foundry equipment in June

(*Continued on page* 188)

NEW FOUNDRY: Kenneth Priestly, left, president of the new Vassar Electroloy Products Inc., Vassar, Mich., releases the first heat of metal into a ladle held by Alfred Kunz, vice president. Looking on are Bradley Wellemeyer, secretary, and Otto Kickodemus, treasurer. All four founders of the company, which is specializing in production of alloy steel castings, formerly were associated with the Foundry Division, Eaton Mfg. Co., Vassar

THIS IS ALL THERE IS to the installation of DRAVO DIRECT FIRED HEATERS



By its very compactness, the gas or oil fired Dravo Heater can be installed with a minimum of time and trouble. It is shipped as a self-contained unit with combustion chamber refractory already in place. The minute that a fuel line, electric power and stack outlet are provided, this economical heater will produce warm air at the temperature and time desired—and with a high degree of fuel-to-air efficiency (80 to 85%).

Because of its self-contained features and compactness, the Dravo Heater is unusually flexible in application. It can be easily moved as heat requirements change and, if floor space is scarce, it can be wall-hung or suspended from the roof trusses. In many cases, Dravo Heaters actually provided temporary heat while a building was being constructed and later were moved to permanent heating positions within the new structure.

The Dravo Heater has effected a new economy in open space heating. Let us point out its advantages on your next heating job. Bulletin 514 free on request. Dravo Corporation, 300 Penn Avenue, Pittsburgh 22, Pa.

DRAVO HEATING

Over the years Ottawa's two outstanding brands —FLINT SHOT and DIAMOND SAND BLAST—have stood the test of time. Today usage of these high quality mineral abrasives is at an all-time high—in tonnage—number of users. Let us help you improve the quality and quantity of your sand blasting operation. Consult us on your abrasive problems.

Write for our booklet—SAND BLASTING UP-TO-DATE

OTTAWA SILICA COMPANY
Ottawa, Illinois

(*Continued from page* 186)

represented 491.7 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. This compares with 577.3 per cent in May and 375.4 per cent in June 1945.

• • •

Robins Conveyors Inc., Passaic, N. J., has consolidated its Philadelphia office, formerly at 12 South Twelfth St., with that of its parent organization, Hewitt-Robins Inc., 401 North Broad St., Philadelphia 8, effective Sept. 1.

• • •

Island Equipment Corp., New York, and plant at Queens Village, Long Island has purchased an additional plant at Hollis, Long Island. This plant is expected to facilitate the production of roller gravity equipment.

• • •

Mateas & Mateas are erecting an addition to their foundry building at 504 Orchard St., Huntington Park, Los Angeles, measuring 30 x 60 ft and costing $8000.

• • •

H. Kramer & Co., 2460 Enterprise St., Maywood, Calif., will construct a foundry building, 50 x 200 ft; warehouse building, 75 x 200 ft; office building, 50 x 125 ft; all of steel and reinforced concrete at a cost of $125,000.

• • •

Anniston Foundry Co., Anniston, Ala., plans an addition to its foundry, estimated to cost about $110,000.

• • •

National Bearing Division of American Brake Shoe Co., 4930 Manchester Ave., St. Louis, plans a one and two-story 180 x 230 ft foundry and 60 x 60 ft office building to be built at Niles, O.

• • •

Forker Corp., 1826 East 47th St., Cleveland 3, manufacturer of tramrail systems, has purchased a new factory with two acres at 2044 Random Rd., Cleveland.

• • •

Keystone Abrasive Wheel Inc., Carnegie, Pa., has opened new offices at 1500 Walnut St., Philadelphia, with B. L. Schaefer in charge, and in the Guardian Bldg., Detroit, in charge of Edward B. Caulkins Jr.

• • •

Manhattan Modeling & Chasing Co., 185 Genessee Ave., Paterson 3, N. J., has changd its name to Manhattan Castings Inc. Michael Kiwad is president.

• • •

Gray iron casting production in June increased 3.1 per cent over May and 5.2 per cent over June, 1945, in the Philadelphia Federal Reserve District, according to the Industrial Research Department of the University of Pennsylvania. Malleable iron production was 17.6 per cent

(*Concluded on page* 190)

can cause a drooping production curve

**Time-honored Borolon and Electrolon Abrasive Products are now distinguished by the name Simonds.*

SIMONDS ABRASIVE CO. *is a Division of*

SIMONDS SAW AND STEEL CO.

Other affiliated Companies:

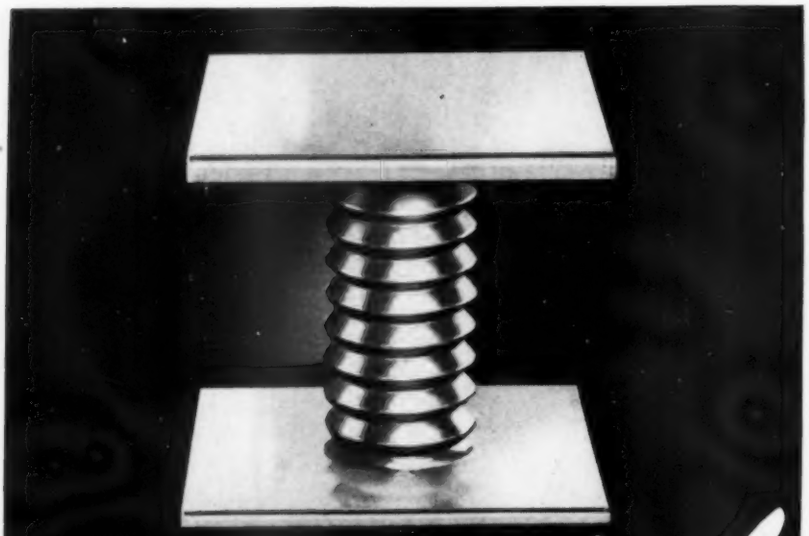
SIMONDS STEEL MILLS · SIMONDS CANADA SAW LTD. etc.

Select from Simonds Abrasive Company's line of Borolon* (aluminum oxide) and Electrolon* (silicon carbide) Grinding Wheels and you take the first step toward eliminating production-robbing fatigue. Fatigue in metal through improper grinding . . . fatigue of the grinding wheel from using the wrong abrasive combination . . . fatigue of the operator trying to force the wrong wheel to cut right . . . fatigue of the grinding machine through uneven wear and stress from out of balance wheels. Guard against this costly factor with efficient wheel selection.

Select the right wheels from all the shapes and sizes in the Simonds Abrasive line. Select the correct grain, grade, structure and bond from these precision manufactured, scientifically tested grinding wheels. Select with assurance of getting time-proven abrasive products for top grinding performance. Large stocks meet all your needs promptly, efficiently. In addition to the help of Simonds Abrasive Distributors, the Simonds Abrasive Data Book is a valuable guide to proper selection. Write for yours today.

SIMONDS ABRASIVE CO.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA., DISTRIBUTORS IN ALL PRINCIPAL CITIES



Vital Details
OF FOUNDRY PRODUCTION!

Compared to the castings in which they are used, chaplets and chills often appear to be trifles. Yet, to foundrymen who are striving for constant improvement in casting quality, they are details of vital importance.

Through years of close association and co-operation with the Foundry Industry, the makers of Milwaukee Chaplets have helped to develop several distinct types of chaplets and chills which have contributed to improved casting production.

The Milwaukee Double Head, Thread Stem Chaplet, pictured above, represents but one of the advancements in chaplet design represented in the *Milwaukee Line* of "Vital Details". It includes Standard Radius Chills, Schmitz Chaplets, Patented Adjustable Radius Chills, Special Chaplets and Related Specialties. Write for Samples and Prices.

Milwaukee
CHAPLET AND MANUFACTURING CO.
1025 S. 40th STREET • MILWAUKEE 4, WIS.

A 5043-⅝

(*Concluded from page* 188)

below May but 38.5 per cent above June, 1945. Steel casting output dropped 18 per cent to the lowest point since 1940, except for February and March of this year, when many plants were closed. No branch of the industry had a larger backlog of orders than at the close of the previous month, and stocks of pig iron and scrap were smaller. Coke supplies were about the same in iron foundries and a little larger in steel foundries.

° ° °

Integrity Supply Inc., New Castle, Pa., has acquired the Ellwood Co., Ellwood City, Pa. Production capacity is being increased by installation of new machinery valued at $250,000. The new company will be known as the National Plumbing Fixture Corp., Frank J. Bentz, secretary. Offices will be maintained in the same building with Integrity Supply Inc., 83 Cliff St., New York. No change in personnel or plant operation is planned.

° ° °

Erie Castings Co., has opened a foundry at 16th and German Sts., Erie, Pa., in a reconverted boiler shop formerly operated by Nagle Boiler Works. Officers of the new company are: Kenneth T. Guyer, president; Fred W. Diemert, vice president; and T. M. Nagle, secretary-treasurer.

° ° °

Pettibone Mulliken Corp., Chicago, has acquired the Daniels Murtaugh Co., Cedar Rapids, Iowa, manufacturer of heavy duty dragline buckets. J. P. Murtaugh, recently vice president and general manager of the acquired company, will represent Pettibone Mulliken on the West coast.

° ° °

Tri State Brass Works, 202 Strand St., Shreveport, La., has changed its name to the Southern Brass Works and has moved to 257 North Market St., Shreveport.

° ° °

Aluminum Co. of America plans to build an aluminum die casting plant just outside the southwest boundary of Des Plaines, Ill. Proposed plant will have a floor area of about 190,000 ft.

° ° °

Triple A Metalcraft Corp., 3421 East 22nd St., Los Angeles, will construct a 52 x 146 ft foundry building costing $40,000 at East 22nd St. and Velasco Ave., Los Angeles.

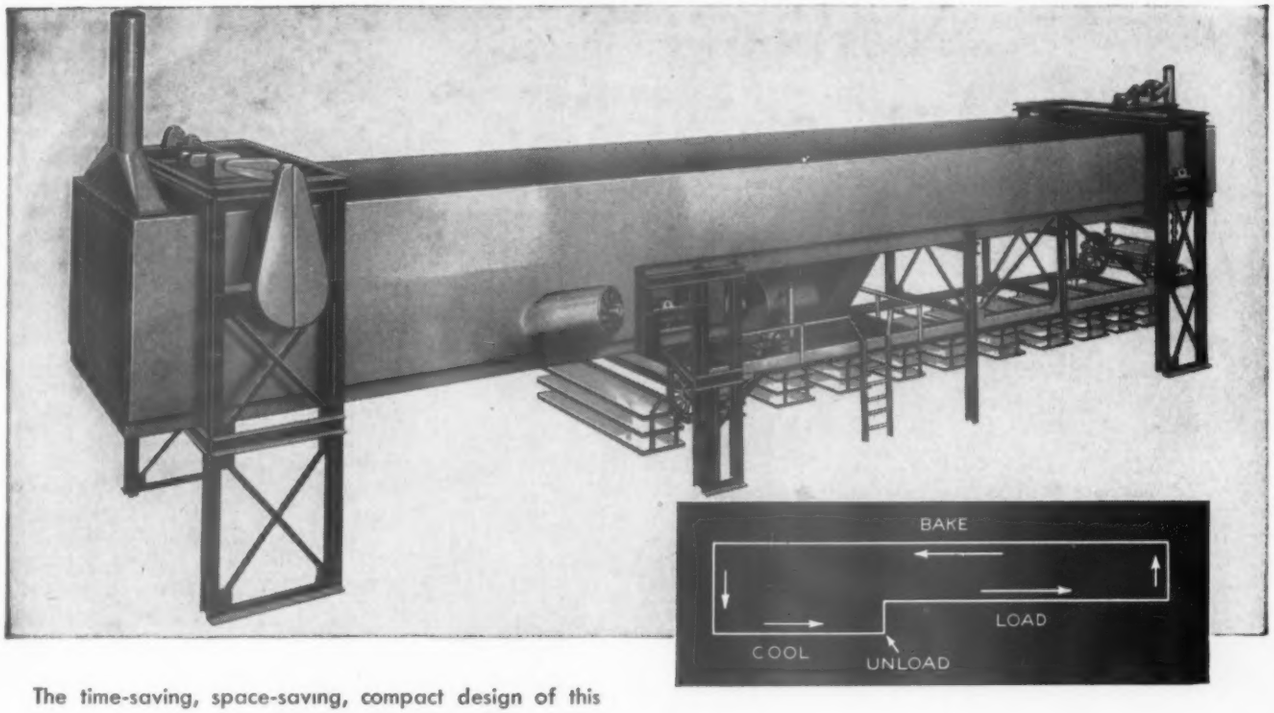
° ° °

Pan American Alloys Inc. has moved from 1115 South Liberty St., New Orleans, to Scottdale, Pa.

° ° °

Sexton Foundry & Mfg. Corp., 511-527 West Conway St., Baltimore, maker of light iron castings for machining and stove repair parts, has acquired the

(*Concluded on page* 192)



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

MEMBER

YOUNG BROTHERS COMPANY

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ESTABLISHED IN 1896

Unrestrained, DUST HOG will eat up your chances of making your plant an efficient working place. Dust—out of control—monopolizes light, spoils workmanship, speeds wear on moving parts, and increases maintenance costs. What is often regarded as merely a nuisance, is usually a profit thief.

How to put DUST HOG in its place is the subject of Pangborn's free booklet, "Control of Industrial Dust". As a first step toward ridding your plant of expensive "dust pockets", request this booklet. Write Pangborn Corporation, 284 Pangborn Boulevard, Hagerstown, Maryland—*world's largest manufacturer of dust control and blast cleaning equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Concluded from page* 190)

former plant of the Westport Paving Erick Co., containing approximately 3500 sq ft of floor space, together with some 90 acres of land. The company is remodeling some of the buildings, and early this fall expects to begin production of small gray iron castings for the jobbing trade. The company will retain its Conway street plant. W. Elbert Sexton is president.

• • •

Baltimore Castings Corp. has paid $600,000 to the War Assets Administration for the magnesium foundry, operated during the war by the Maryland Sanitary Mfg. Corp. at 4500 East Lombard St., Baltimore. The company will manufacture soil pipe and fittings and expects to go into operation early in September with approximately 200 employees. R. D. Watson, president, James A. Messer Co., plumbing supplies, 1206 K street, N. W., Washington, is head of the Baltimore Castings Corp. John M. Franks is works manager.

• • •

Keystone Foundry Inc. has awarded a contract for a 1- and 2-story foundry building 40 by 85 feet, at 1210-1212 Ridgely St., Baltimore. The new foundry will produce gray iron castings used in electrical work. R. K. Hoke, president of the Keystone Electric Co., is head of the Keystone Foundry, and the foundry will adjoin the plant of the former.

• • •

Griswold Mfg. Co., Erie, Pa., has announced that eastern interests have arranged for purchase of the company, which will continue with its present working organization. The plant produces iron, aluminum, stainless steel and electrical kitchen utensils.

• • •

Pick Industries, West Bend, Wis., has begun construction of a new foundry, 130 x 150 ft, to be of concrete and steel construction and equipped with modern foundry equipment for production of gray iron castings used mainly for water pumps for autos.

• • •

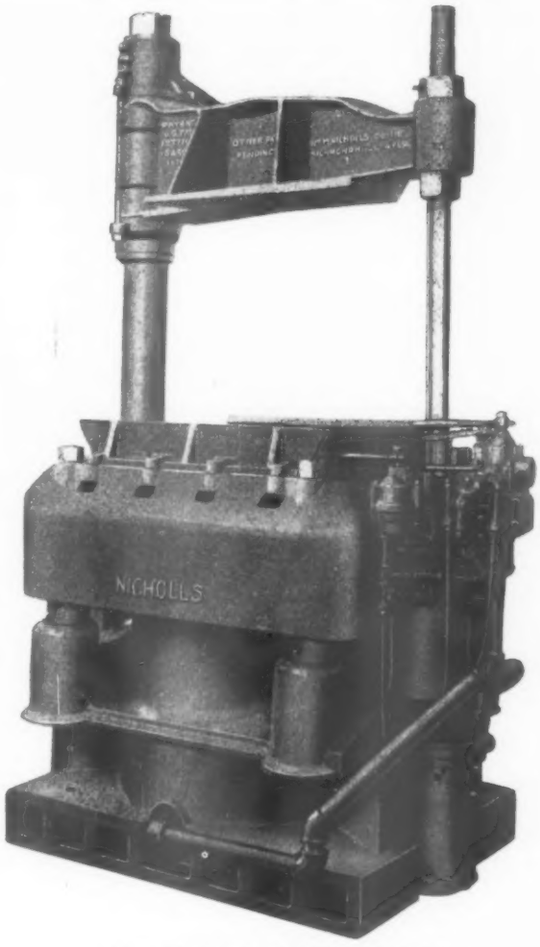
American Alloy Foundry, 112 South Eden St., Baltimore, producer of aluminum and brass castings, has acquired an adjacent building and is remodeling it for its own uses. Garry Gunther and August F. Kroether are partners in the business.

• • •

Fergus Foundry Co., division of the Adelsman Co., Fergus Falls, Minn., has begun construction of a new foundry there, to replace its plant which was recently destroyed by fire.

• • •

Renfrow's Gray Iron Foundry, 4913 West San Fernando Rd., Los Angeles, will construct a new office building.



33-54 TYPE "D" MOLDING MACHINE
33" Squeeze Piston 13" Jolt Piston

A Flask Roll-Off Attachment is available as an extra accessory

Heavy Duty Molding Machines

GUARANTEED WORKMANSHIP—

Smooth, sensitive operation is built into all moving parts of Nicholl's Molding Machines by expert mechanics skilled in their specialized tasks. Close tolerances are made possible by a system of accurate jigs and fixtures.

PERMANENT ALIGNMENT—

The main support base with its brackets, cylinder and upright bearings are all cast in one piece for rigidity to avoid mis-alignment and loose parts from constant jolt and squeeze operations. The overhead cross arm and the squeeze head are braced with heavy ribs and supported by an outboard bearing. This design maintains permanent alignment and provides an equalized squeeze. The entire assembly swings by pneumatic power on double roller bearings. The control is combined with the others at the front of the machine handy to the operator.

Can also be equipped with Push-Button Control for all operations, including Automatic Jolt and Squeeze Timing.

Illustration at right gives close-up rear view of heavily braced squeeze head showing pneumatically powered cylinder mechanism.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

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NICHOLLS

EFFECT OF HEAT TREATMENT ON STEEL CASTINGS

(*Continued from page 99*)

mass is increased. It follows, therefore that the most complete homogeneization in the shortest possible time would be accomplished with the steel in the molten condition. Oviously, it is impossible to do this because the cast article would lose its shape and also undergo segregation upon resolidification, thus defeating the purpose of the heating. A slightly longer time is required for diffusion and dispersion in the solid state, but this is offset by the fact that the relative immobility of the crystals prevents segregation upon cooling. Selection of the correct temperature and length of time needed to secure the desired results is governed by the change which takes place in the iron upon heating.

Austenizing — Extensive studies of pure iron have revealed that it can exist in two principal forms, known as alpha iron and gamma iron. There are other known forms, but discussion of them is omitted here for sake of clarity since they have but little bearing upon the subject at hand. The alpha form of iron which exists at the lower temperature will transform to the gamma form, (the high temperature modification) without any apparent change in the external appearance of the metallic object. This process is reversible, the gamma form reconverting to the alpha upon cooling below a certain temperature. It is this attribute which enables one to change the physical properties of steel through heat treatment.

Since most of the alloying elements are more soluble in the gamma phase and all diffuse more readily at elevated temperatures, heating to the gamma stable temperature aids diffusion. When heated to this temperature, the solid solution known as austenite is formed and process of heating steel to achieve this result is known as austenizing. Inasmuch as the various alloying elements, particularly carbon, change the transformation temperature of alpha to gamma iron, it is important to know the extent of the change. The temperature at which this occurs in the different steels is known as the *critical temperature* and is a constant for each particular composition. Since it is common practice to speak of the *criticals* when referring to the transformation temperatures, this term will be used in the ensuing discussion.

Grain Size — It will be recalled that austenizing offers a means of securing diffusion and dispersion due to solution. Therefore, it would seem logical to heat the steel to increasingly higher austenizing temperatures approaching the melting point in order to accelerate the reaction. This would be feasible if it were not for the fact that iron oxidizes very rapidly at these temperatures and grain enlargement also takes place. The formation of heavy scale or excessive oxidation can be minimized at lower temperatures, but is not controllable commercially at temperatures near the melting point of steel. Heavy scale obviously is harmful on a steel part and requires no further comment.

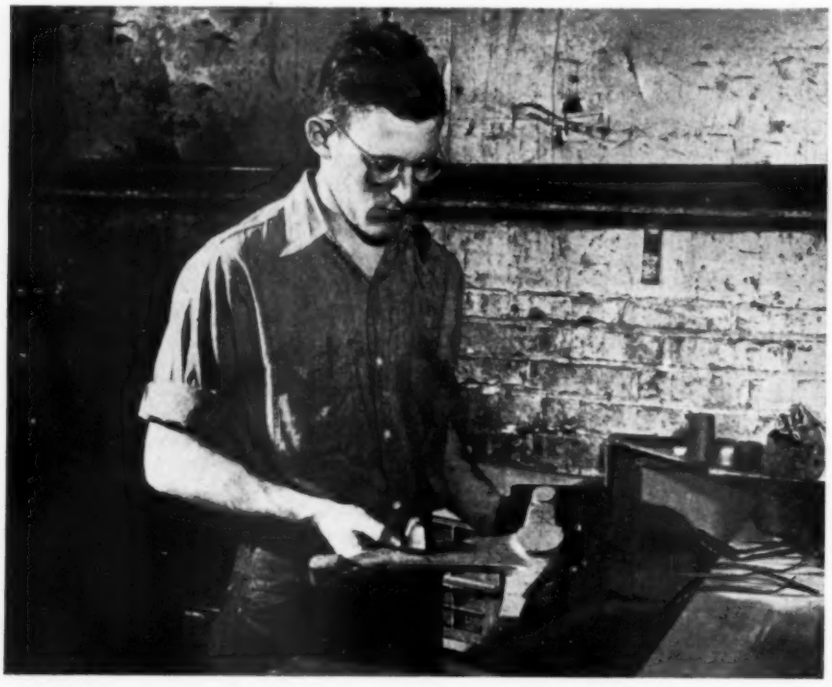
The enlargement which takes place in the austenite grain upon prolonged heating at a high temperature persists in the steel after cooling to room temperature. Enlarged austenite grains are conducive to a brittle condition in the steel. This enlargement is the result of individual grains combining with adjacent ones to produce one large grain.

Susceptibility of a steel to grain enlargement is dependent upon the composition as well as certain foundry technique. Even though a composition is selected that is not subject to excessive grain enlargement sound heat treating practices demand that a margin of safety be employed to obviate any difficulty from this source. Because of this a temperature just above the critical is best suited for austenization.

Effect of Heating — The austenizing temperature, being a function of the upper critical on heating, is predetermined on a basis of a slow heating rate. When employing a more rapid heating rate than that resorted to in the determination of these criticals, a slightly higher temperature must be used. This effect on the raising of critical values is of minor importance, but must be taken into consideration.

Of greater significance is the physical effect of rapid heating. The geometry of the casting controls the rate at which it may safely be heated to a certain temperature. Where abrupt changes in section are encountered, the heat must be applied at a rate that will permit its transmission through the piece without a high thermal expansion or volume change at the junction of these sections. Failure to observe the proper heating rate will lead to excessive cracking. In many cases this cracking would not be in evidence until the piece is fabricated.

Time at Heat—The length of time at the austenization temperature is governed by the composition, shape and volume of the casting. In a steel having a low alloy content it would only require heating to the proper temperature and holding long enough to insure uniformity. When steels of higher alloy content are to be heat treated, it may require several hours at the austenizing temperature to insure complete solution. The longer steel is held at this temperature, the better the diffusion of the alloying elements and



CHAMPION APPRENTICE: Lawrence Kinsinger, apprentice in the foundry training course at Caterpillar Tractor Co., Peoria, Ill., and winner of the 1946 AFA apprentice contest in gray iron molding. He won the same contest in 1943 but between then and last November was in military service

subsequently more uniformity of structure.

It is common heat treating practice to apply the rule of 1 hour per 1 in. of cross section when determining the time at heat. This rule is applicable to common steels, but, as previously mentioned, the amount and kind of alloying constituents must be taken into consideration and the time proportionately increased to assure thorough diffusion. A minimum time should be established for a certain composition, as the general rule is to increase rather than decrease this time. Provided that the proper temperature has been selected and maintained, no harm is done if this time is exceeded.

Effect of Cooling Rate—The rate of cooling from above the critical temperature and after proper solution has taken place, controls the size of the crystalline particles in the steel at room temperature. As mentioned previously, the ultimate in strength and ductility with any given composition is dependent upon a small evenly dispersed crystalline structure in a homogenecus matrix. Homogeniety of the matrix is accomplished by proper austenizing. Small crystals are achieved by rapid cooling. It is, apparent therefore, that the cooling rate is as essential to the attainment of maximum physicals as the homogeneization.

Compare Steel and Salt

In order to obtain a better grasp of the mechanics of small crystal formation as induced by rapid cooling, let us again draw a comparison between steel and salt solution. The amount of salt that will dissolve in a given volume of water increases with an increase in temperature. Conversely, the amount of salt that can be held in solution decreases as the temperature of the hot solution is decreased. If the hot saturated solution is allowed to cool very slowly to room temperature, large salt crystals form, but if the same solution is cooled rapidly, the crystals formed are small in size.

An analogous condition exists with the carbon in steel, only in this case the crystallization takes place with the material in the solid state. The very small carbide crystals formed on rapid cooling are extremely hard and correspondingly brittle. If, on the other hand, steel is allowed to cool slowly from the austenizing temperature, coarser particles are formed which produces a softened condition in the metal. Rates of cooling between very rapid and relatively slow will produce intermediate structures between fine and coarse, with their corresponding hardnesses.

A more complete picture of the mechanics of the heat treating processes may

(*Continued on page* 198)

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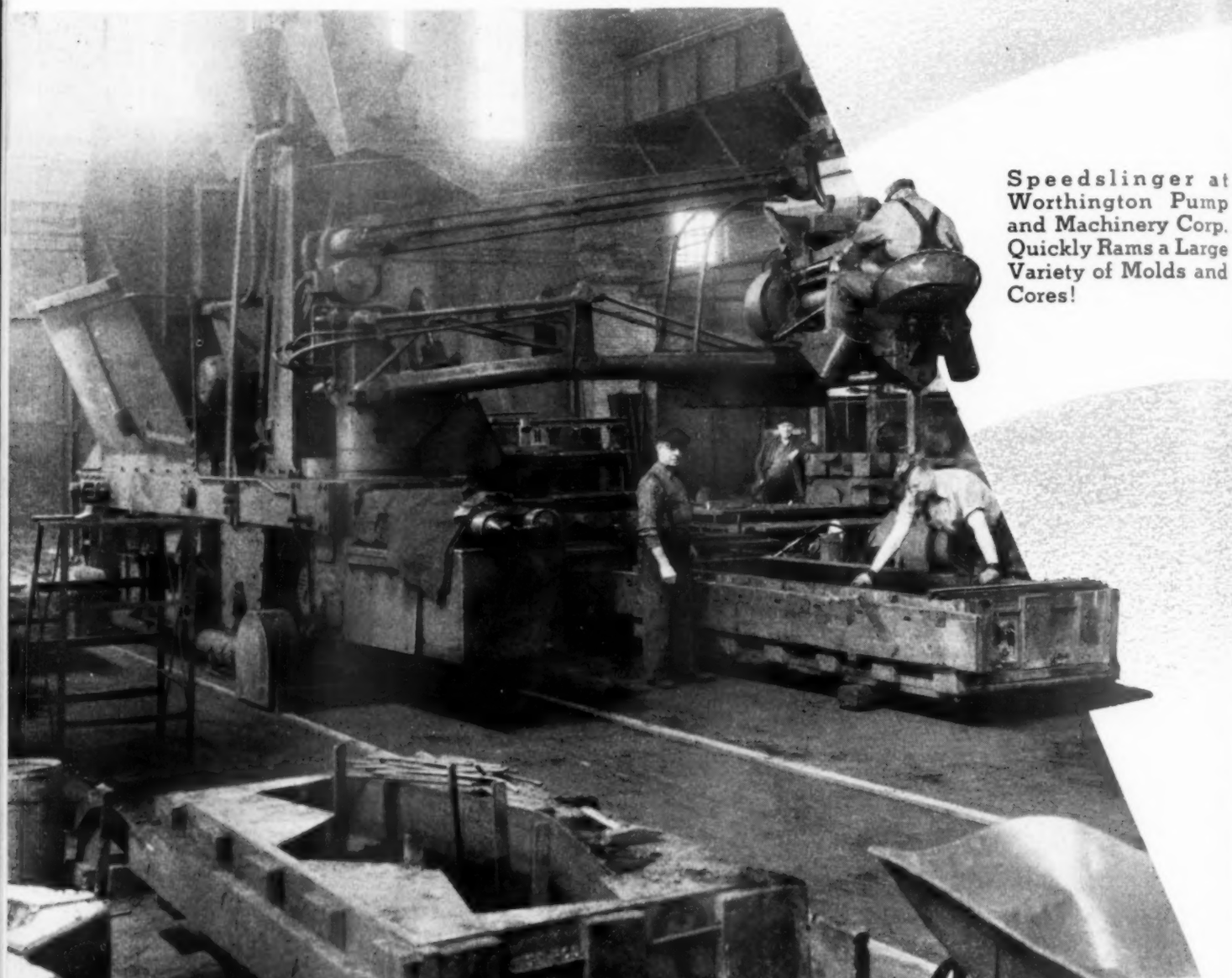

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SPEEDSLINGER ramming the cylinder core with box in position after second draw. To ram this core by any method other than the "Slinger" would be very slow and extremely difficult.

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(*Continued from page* 195)

be obtained if a specific example is cited. The benefits of thermal processing cast articles can be visualized by taking samples of a given composition, machining to 1-in. rounds, subjecting to various heat treatments and then comparing the results of physical tests obtained. The optimum conditions necessary for the attainment of any given result may be set forth, but it must be realized that all of the variables which might be encountered cannot be anticipated. For this reason, the following discussion applies to one particular steel composition under one particular set of conditions.

The detrimental structures produced during solidification are resistant to change due to the slow diffusion rates in the solid state. The refinement and desired good qualities in the metal cannot be realized through a single treatment and for numerous reasons should not be attempted where the ultimate in physicals are desired. Generally speaking, at least three distinct heat treating operations should be employed. However, certain circumstances necessitate a fourth heat treating operation. Such is the case in high speed machining practice where a harder structure would be detrimental to tool life and production. The annealing operation to attain a soft structure involves the use of a slow cool from the austenizing temperature. An alternate method that utilizes subcritical temperatures may be used.

Effect on Physical Properties—A steel whose chemical composition is C 0.30-0.40 per cent, Mn 0.60-0.90 per cent, Ni 1.50-1.75 per cent, Cr 0.40-0.65 per cent, Mo 0.20-0.35 per cent was selected for study. Bars of this composition when cast into samples of 1¼ x 1¼ x 6 in. have the following physical properties and approximate critical temperatures:

Tensile strength (psi)	11),900
Yield strength (psi)	7 ,240
Elongation (% in 2 in.)	2.5
Reduction in area (%)	3.6
Hardness (bhn)	286

	On Heating	On Cooling
Lower Critical	1350F	725F
Upper Critical	1425F	1220F

Normalizing—This annealing operation is performed by heating the steel to some point (usually 100F) above the upper critical and allowing to cool in still air at room temperature. It is one of the simplest heat treatments to perform and requires the least amount of equipment. In the case of the steel composition described, normalizing involves the heating of the casting at a fairly rapid rate to a temperature of about 1750F, holding at this temperature for one-half hour, re-

moving from the furnace and allowing to cool.

It may be noted that a temperature of about 300° above the upper critical (1425F) has been employed. This high temperature is selected so as to obtain solution diffusion of the alloying elements in a short period of time. Due to the amount and type of alloys present, the diffusion tends to be sluggish in steel of this composition and it has previously been established that this treatment will not produce grain coarsening. Inasmuch as the steel is allowed to cool fairly rapidly from this relatively high austenizing temperature, the elements tend to be held in solution in the dispersed form upon reaching room temperature.

Normalizing Furnaces—If the castings are not large and the furnace is at the temperature to which it is to be heated prior to their introduction, a heavy scale will not form. For this reason, normalizing furnaces can be of the open flame type since the scale formed under these conditions is both light and easily removed. It should be borne in mind that the castings must not be piled densely when loading or there will be a variation in the structure between those in the center of the pile and those on the outside. This variation is caused by the difference in cooling rates. Furnaces of the continuous type are very adaptable to normalizing work where production demands are sufficient to warrant their use.

Effect on Properties—The normalizing treatment breaks up the dendritic structure formed during the solidification of the metal and produces some grain refinement. However, if the time at this temperature is extended too long, grain coarsening is liable to result. The beneficial results obtained from the normalizing procedure alone may be noted by comparing the physical properties of the steel before and after this treatment, as follows:

	As Cast	After Normalizing
Tensile, psi	119,900	138,400
Yield, psi	77,240	87,200
Elongation, %	2.5	6.5
Red. of area, %	3.6	10.4
Hardness, bhn	286	277

Physical properties of the steel in the as-cast condition are subject to wide variation due to the lack of uniformity of structure from one casting to the other. The normalizing equalizes these differences besides enhancing the physical properties. While this single treatment contributes to an increase in strength and ductility, it does not represent the ultimate obtainable, thus necessitating further heat treating. Where design requirements are such that exact dimension must be secured, involving the use of extensive machining operations, the steel must be annealed. This annealing

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operation is necessary only when the normalizing treatment results in a structure too hard for ease of machining.

Box Annealing—When alloy steel of the reference composition is cooled in air from the austenizing temperature, hardening results. The amount of hardening depends on the size of the casting, but in many cases is sufficient to produce hard structures. Common annealing practice employs slow cooling from above the critical temperature. Since this results in the casting remaining in the furnace at elevated temperatures for extended periods, protection from scaling is required. The castings to be so treated are placed in a metal box and covered with a protective material while being heated and cooled, hence the name *box annealing*.

The mechanics of softening are the reverse of hardening and we therefore must heat the steel to a point just above the upper critical and allow it to cool at the rate of about 10 to 25° per hour to a point below the lower critical (725F). Box annealing can be performed by placing the castings in a metal box, covering them with pitch coke and in turn charging these boxes into a suitable furnace. The boxes and contents are heated to about 1450F and held at heat for three hours. The burners are then shut off and the entire load allowed to cool in the furnace until the castings reach a temperature of 700F. At this point they may be dumped out of the boxes and allowed to cool rapidly. The use of boxes in which the castings and pitch coke are placed insures a slow cooling rate since the mass is large. A further grain refinement and homogeneization is attained in the metal since a low austenizing temperature is used.

Furnaces used for box annealing are able to hold fairly large loads. Since a long time interval is involved, it is imperative that the furnace be of such size as to insure sufficient production. Usually these furnaces are of the car bottom type with open flame burners and are built so that the boxes can be loaded on the flat bottomed car which in turn is pushed into the furnace proper for the heating operation. The metal boxes and the pitch coke keep the gases of combustion from coming in contact with the castings and for this reason open flame burner arrangement will suffice.

Subcritical Annealing—An alternative heat treating process to attain a soft machineable structure is a subcritical draw, preferably 50 to 100F below the lower heating critical. On the steel in question this would be 1250 to 1300F. This heat treatment, if carried on for the proper time, results in the agglomeration of the carbide constituent into a spheroidal form imbedded in a soft ferrite matrix. Steel in this condition is relatively soft and easy to machine. The spheroidized carbides also tend to make the steel more responsible to subsequent heat treatment.

The principal advantage lies in the low temperature at which this operation is carried out, 1250 to 1300F. Packing in pitch coke is unnecessary because scaling is not excessive. The operation can be performed in a manner similar to the normalizing treatment using the same type of furnace.

The physical properties attained in both of these annealing operations are given below. In the case of the sample given a sub-critical anneal, it was heat treated at 1250°F. for 20 hours in addition to the usual normalizing.

	Box Anneal	Subcritical Anneal
Tensile, psi	99,800	106,100
Yield, psi	66,800	78,640
Elongation % ...	24.5	22.0
Red. of area, % ..	44.9	55.7
Hardness, bhn ..	195	223

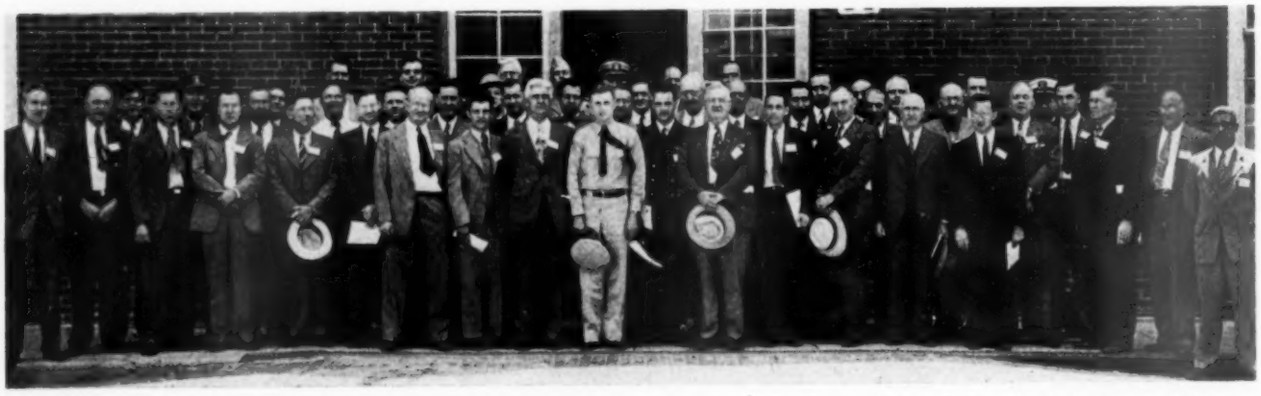
Increase in Strength by Hardening—After the castings have been made suitable for machining by the annealing operation they are in a state of lowest strength, for the tensile strength of a steel is directly proportional to its hardness. However, steel in its hardest condition or state of highest strength is extremely brittle. Since brittleness must be avoided, it is not desirable to have the highest strength obtainable in any article and the term *toughness* more aptly describes the condition desired. Metallurgically speaking, the softest structure can undergo considerable plastic deformation without rupturing; conversely, little deformation takes place in the hardest structure. It is evident that a compromise must be struck. By securing the proper hardness through correct heat treatment, optimum strength with relatively high ductility can be obtained. To accomplish this desirable condition in the cast article, it must be hardened and subsequently draw tempered.

Mechanics of Hardening—In order to harden steel, it must be cooled rapidly from a temperature above that of the upper critical (heating). A further grain refinement and slight increase in uniformity is realized. For the steel under consideration this temperature is 1500F and the means of rapid cooling is an oil quench. Heating to this temperature and holding for one-half hour per inch of cross section makes the steel completely austenitic.

It may be rembered that the alloying elements are in solution when the steel is austenitic. A rapid cooling from this temperature produces a similar effect to that of the hot saturated salt solution when supercooled. In the case of steel, minute crystals of iron carbide are formed which are called *martensite*. These crystals are extremely hard and are therefore the cause of hardness in steel, which in turn makes them the source of high strength in this material. Steel of such high hardness and strength would be extremely brittle and it is imperative that this material be tempered to make it more ductile.

The important role played by the alloying elements in steel is due mainly to the effect they have on the ability of the

(*Continued on page 202*)



NAVY YARD FOUNDRYMEN: Participants in the open house and foundry program held at the Norfolk Navy Shipyard, Portsmouth, Va., June 11-12. Approximately 50 representatives from the Navy Department, Yards and Stations attended

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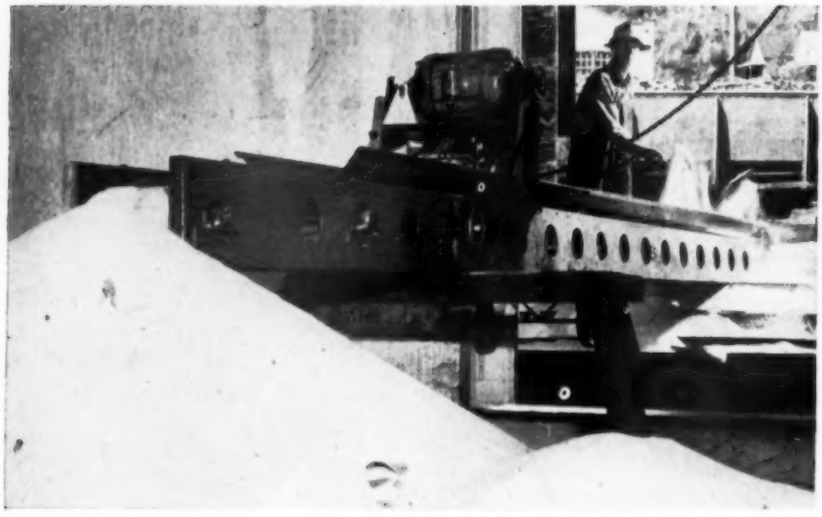

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(*Continued from page 200*)

steel to harden completely through all cross sections. This hardening effect can be partially nullified by a scale coating on the parts. Provisions are usually made to insure scale-free surfaces prior to introduction into the hardening furnaces, and some means of minimizing scale formation during heating must be provided.

Since the steel has been placed in a responsive condition prior to hardening, the time at heat is usually less than that of the other heat treating operations. In some instances muffle type furnaces are utilized, but ideal conditions require the use of atmosphere control to preclude scaling. Unless production requirements are such that a continuous installation is feasible, small batch type furnaces can be used.

Quenching—After the steel has been put in the austenitic condition by the hardening furnace, hardening is accomplished through the rapid cooling from this temperature. When the alloy content of the steel is extremely high, an air quench will produce a completely hard structure. In the lower alloyed steels, the cooling rate must be more rapid, which may be realized through the use of a liquid medium such as water or oil. For any given composition, there is a critical cooling rate which will result in the maximum hardening of the steel. When cooling in excess of the critical rate is employed, cracking may result. On the other hand, insufficient hardening will be encountered if less than the critical rate has been used.

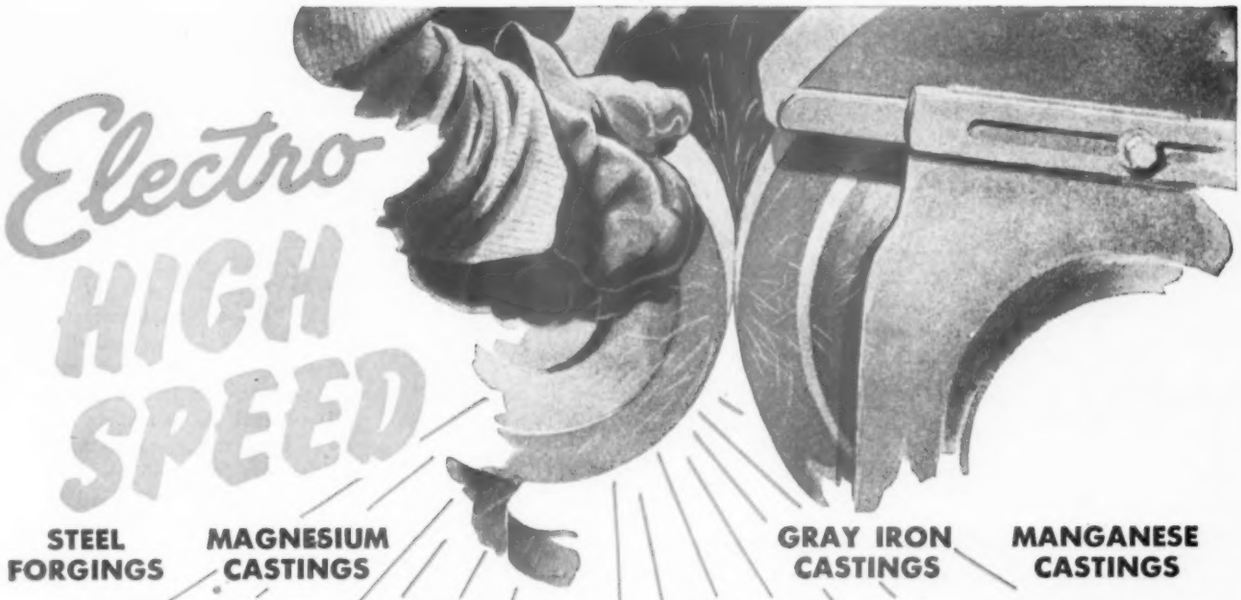
Due to the differences in rates of heat transfer exercised by various liquids, the metallurgist can secure these varying rates of cooling. The efficiency of these cooling mediums is dependent upon the amount of agitation as well as the physical characteristics of the liquids.

The reference composition in the form of 1-in. rounds was cooled in a suitable quenching oil because the alloy content of the metal was sufficient to insure complete hardening with this liquid. In considerably heavier sections it would be necessary to use water or brine to achieve the same result. Care must therefore be exercised in selecting the quenching medium for hardening.

Increasing Toughness by Draw Tempering—The previously hardened steel in its brittle state must be put in a ductile condition by tempering the martensite formed in the quench. The heat treating process which performs this function is called *draw tempering*.

When martensitic steel is heated to a temperature below the lower critical (heating), it undergoes a certain change

(*Continued on page 204*)



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(*Continued from page* 202)

in structure resulting in a softening. The amount of softening is almost a linear function with temperature, i.e., for a given increment in temperature increase a corresponding decrease in hardness results. Not only does the draw tempering soften the steel, but it also relieves any strains that might be set up as a result of the sudden shock undergone by the steel in being cooled rapidly from a high temperature. Inasmuch as the steel is not heated above the critical during the draw tempering operation, rapid cooling from this temperature will not result in hardening.

The draw temperature selected for a hardened steel depends upon the tensile strength desired in the finished article and upon the chemical composition of the material. For the steel under discussion, a temperature of 1100F for a period of one hour at heat will produce an as-drawn hardness of 322 bhn. This steel in its final heat treated form will have the following approximate physicals: Tensile 155,500 psi; yield 141,500 psi; elongation 14.5 per cent and reduction of area 47 per cent.

Treatment Increases Strength

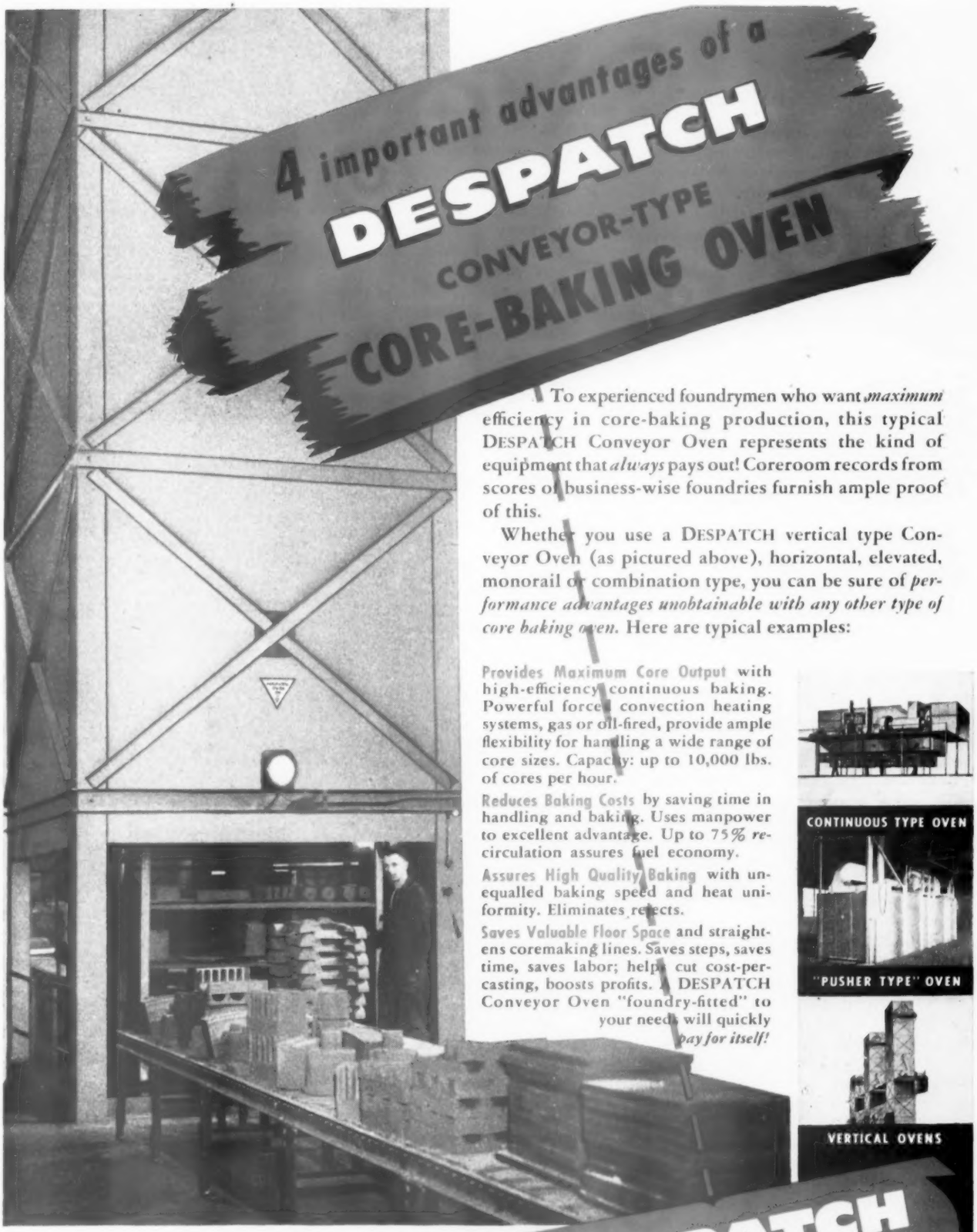
A comparison of these figures with those obtained after normalizing shows that a great increase in strength has been obtained without a corresponding decrease in ductility or toughness.

The only requirements of a furnace suitable for draw tempering are that it be sufficiently large and have adequate controls for maintaining the desired temperatures. The hardened cast steel parts can be drawn in either the open flame or muffle type of furnace, since the temperatures attained in this phase of the heat treatment are relatively low and are not conducive to scaling. Both the batch and continuous type of construction is utilized on production demands and availability of equipment.

Summary—In this discussion an attempt has been made to outline briefly the physical and chemical changes undergone by cast steel during heat treatment. The effect of these changes on the strength and ductility may be summarized as follows:

1. In the as-cast condition steel lacks homogeneity and is relatively low in strength.
2. Normalizing produces some refinement with slight improvement in the physical properties.
3. Box annealing after normalizing produces further refinement and puts the steel in a condition for rapid machining.
4. Hardening by quenching causes a brittle condition with high strength but

(*Concluded on page* 206)



4 important advantages of a DESPATCH CONVEYOR-TYPE CORE-BAKING OVEN

To experienced foundrymen who want *maximum* efficiency in core-baking production, this typical DESPATCH Conveyor Oven represents the kind of equipment that *always* pays out! Coreroom records from scores of business-wise foundries furnish ample proof of this.

Whether you use a DESPATCH vertical type Conveyor Oven (as pictured above), horizontal, elevated, monorail or combination type, you can be sure of *performance advantages unobtainable with any other type of core baking oven.* Here are typical examples:

Provides Maximum Core Output with high-efficiency continuous baking. Powerful forced convection heating systems, gas or oil-fired, provide ample flexibility for handling a wide range of core sizes. Capacity: up to 10,000 lbs. of cores per hour.

Reduces Baking Costs by saving time in handling and baking. Uses manpower to excellent advantage. Up to 75% *re*-circulation assures fuel economy.

Assures High Quality Baking with unequalled baking speed and heat uniformity. Eliminates rejects.

Saves Valuable Floor Space and straightens coremaking lines. Saves steps, saves time, saves labor; helps cut cost-per-casting, boosts profits. A DESPATCH Conveyor Oven "foundry-fitted" to your needs will quickly *pay for itself!*

CONTINUOUS TYPE OVEN

"PUSHER TYPE" OVEN

VERTICAL OVENS

CAR TYPE OVEN RACK TYPE OVEN

DRAWER TYPE OVEN

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

WRITE TODAY
for complete details,
Despatch Oven Company
615 Eighth St. S. E., Minneapolis 14, Minn.

(*Concluded from page 204*)

poor ductility. Further grain refinement is also secured.

5. Draw tempering of the hardened steel makes it tougher with comparatively high strength.

The refinement which takes place in the macrostructure is illustrated in Figs. 1 and 2. These photomacrographs were taken under identical circumstances with the same etchant and magnification. The lack of a definite pattern in Fig. 2 is evidence of the refinement which has taken place through the solution diffusion during heat treatment. When we examine the microstructure of these two samples, Figs 3 and 4, we see further evidence of the uniformity obtained by the proper heat treatment.

Results of physical tests on the 1-in. bars at various stages of the heat treating process are summarized for ease of comparison in Table I.

Conclusion—If heat treating alone can almost double the strength of a cast article without an attendant doubling of the cost, there should be no doubt in the foundryman's mind for the need of an adequate heat treating department. It must be borne in mind, however, that factors other than those discussed have a definite bearing on the ultimate properties of the cast steel article. All of the good that may be realized by heat treating can be undone by lack of control of the composition and unsoundness in the casting. Therefore, of great importance is the founding technique and practices employed.

Since only the basic principles of heat-treating have been covered, the information contained in this article does not establish inflexible rules for the foundryman to follow. The diversified application of castings makes it imperative that each individual case be handled separately. By applying correct metallurgical reasoning to the study of the various factors involved, a successful solution to these problems may be secured.

FOUNDRY WAR SURPLUS

Available Through WAA

WAR ASSETS ADMINISTRATION has compiled helpful information to acquaint foundrymen with the procedures for obtaining surplus foundry equipment which is sold from general inventory and at site sales.

In some cases surplus foundries may be bought in their entirety including land, buildings and equipment. Equipment can be procured in cases where stripping or dismantling of one or more separate items, apart from land and buildings, has been authorized.

Because most surplus property is sold through the 33 regional offices of WAA, the best procedure in purchasing foundry equipment is to contact the regional offices all of which publish offering lists of equipment available. The lists are sent out on request and can be checked for foundry equipment.

In visiting the regional office, specific inquiry about foundry equipment should be made. Manufacturers who have been most successful in locating surplus foundry equipment are those who prepared a detailed list of their requirements in advance and sent qualified personnel to check the available surplus at their regional office or offices in other regions.

Such a list should include the name of the equipment's manufacturer, the model number and the electrical characteristics — volts, amperes, cycles — wherever they apply. In addition to the desired model, the list should show the most acceptable substitutes.

Reports to the Washington office indicate that the largest current inventories of foundry equipment are located in the Cleveland, Detroit, Chicago and New York regions. If personal visits to these and other regional offices cannot be made, the offices may be contacted by telephone, wire or letter.

Although foundry equipment is handled in its own section, conveyor equipment, which may be suitable for foundry service, is dealt with by the materials handling equipment section.

Purchase of available equipment is subject to the priority groups established under the Surplus Property Act of 1944, as amended. In the order named, federal agencies, veterans of World War II, RFC buying for small business, state and local government agencies and eligible non-profit institutions have priority. Briefly, RFC defines small business here as companies with not more than 500 employees or which do not hold a dominant position in their fields.

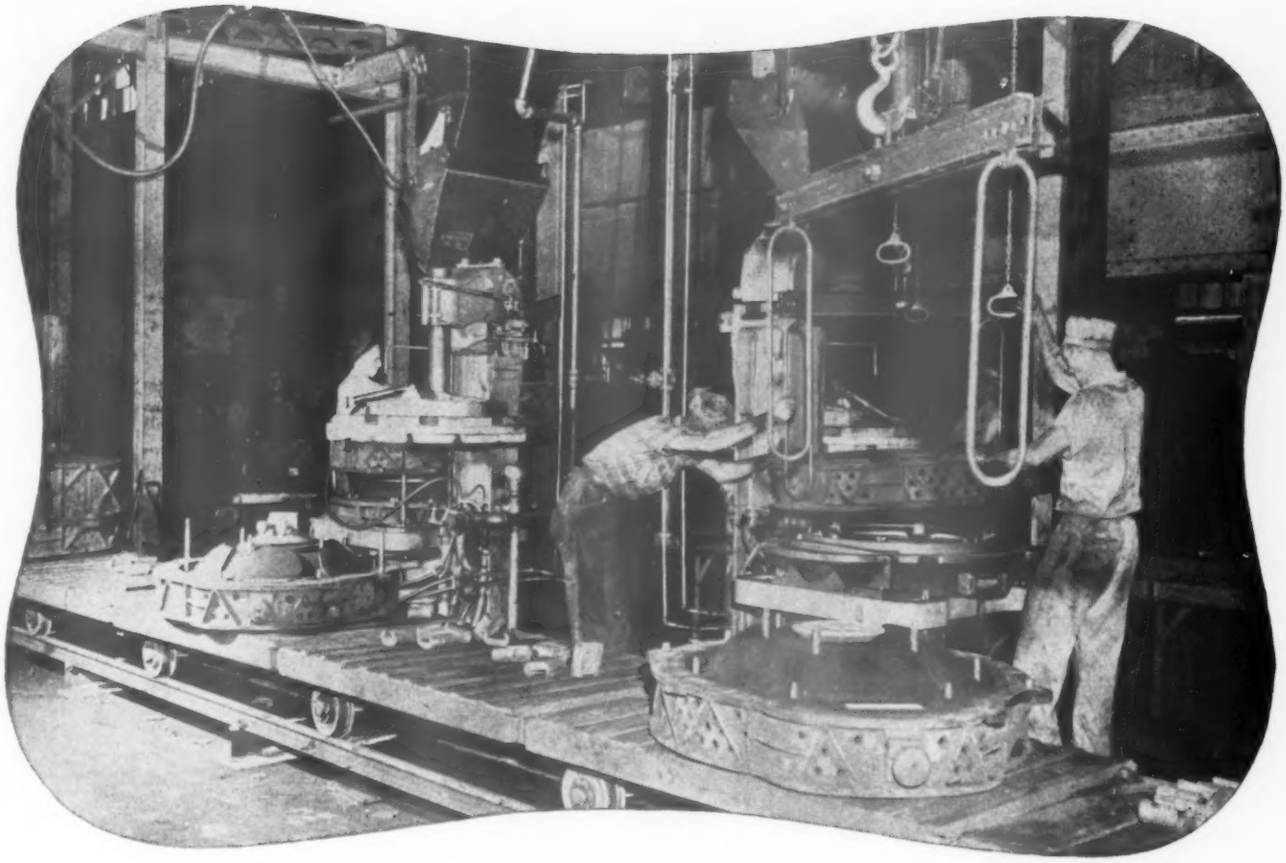
Priority groups are given a specified time in which to buy after which the surplus is available for general purchase. For instance, the first few days of a site sale, where surplus foundry equipment is sometimes available, are set aside for sales to federal agencies; a somewhat longer period is reserved for veterans' purchases and then the other groups usually get one or two days each.

Details on this subject and all others concerning purchase of surplus may be obtained from regional offices listed below. A booklet, "Surplus Property," which is helpful in outlining buying procedures is published by WAA.

Names, addresses and telephone numbers of War Assets Administration Regional Directors are:

Atlanta—H. L. Kennon, 699 Ponce de Leon Ave., N. E., phone Cypress 3611.
Birmingham—McClellan Ratchford, 1955 50th St., North Birmingham, phone 9-6171.
Boston—John E. Millea, 600 Washington St., phone Lafayette 7500.
Charlotte, N. C.—J. K. Wilson, 317 South Tyron St., phone 4-5381.
Chicago—Fred A. McLauchlan, 209 South LaSalle St., phone Franklin 9430.
Cincinnati—Rowland D. Schell, 704 Race St., phone Parkway 7160.
Cleveland—Stanley G. Backman, Higbee Bldg., East Thirteenth & Euclid Ave., phone Cherry 5951.
Dallas 1, Texas—H. L. Holliday, 2001 McKinney Ave., phone Riverside 4371.
Denver—John A. Skeen, Commonwealth Bldg., 728 Fifteenth St., phone Keystone 4151.
Detroit 26—Henry F. Eckfeld, Buhl Bldg., phone Cherry 4920.
Fort Worth, Texas—Hamilton Morton, Texas & Pacific Office Bldg., P. O. Box 1407, phone 35381.
Helena, Mont.—Henry C. Helland, Power Block, phone 1224.
Houston, Texas—Albert Regester, 1020 McKinney Ave., phone Charter 4-6672.
Jacksonville, Fla.—William J. Warren, St. John's Shipyard, Administration Bldg., phone 52922.
Kansas City, Mo.—John E. Kirchner, Troost & Bannister Rd. (95th St.), phone Delmar 3500.
Little Rock, Ark.—Charles S. Christian, Wallace Bldg., no phone.
Los Angeles—George F. Ballif, Jr., Mode O'Day Bldg., Hill St. & Washington Blvd., phone Richmond 2311.
Louisville 2—Robert D. Bottomley, Hoffman Bldg., 139 South Fourth St., phone Wabash 7541.
Minneapolis—Arthur W. Carlson, 504 Metropolitan Life Bldg., phone Atlantic 4172.
Nashville, Tenn.—H. W. McMeanaway, Consolidated-Vultee Bldg., phone 4-7611.
New Orleans—Leonard E. Barnes, 7020 Franklin Ave., P. O. Station D, phone Crescent 9971.
New York—Frank L. Seymour, 350 Fifth Ave., phone Murray Hill 3-6800.
Oklahoma City 2, Okla.—R. D. Wilber, Jr., 200 Cotton Exchange Bldg., phone 2-8521.
Omaha 2, Nebr.—Gordon T. Burke, 601 WOW Bldg., phone Jackson 8200.
Philadelphia—F. L. McNamee, Lafayette Bldg., Fifth & Chestnut, phone Kinsley 1500.
Portland, Oreg.—C. T. Mudge, Fenton Bldg., 310 S.W. Sixth Ave., phone Broadway 7741.
Richmond 24, Va.—A. H. Graham, East End Fourth St., phone 73491.
St. Louis—Charles G. Alexander, 505 North Seventh St., phone Central 8900.
Salt Lake City 1, Utah—Joseph S. Willes, 222 South West Temple, phone 5-7503.
San Antonio 5, Texas—W. J. Walthall, Third Fl. Transit Tower Corner, South St. Mary's & Villita., phone Cathedral 1461.
San Francisco 2—Leland D. Dedo, 30 Van Ness Ave., phone Underhill 2425.
Seattle 1—Orrin C. Bradeen, 2005 Fifth Ave., phone Main 2782.
Spokane—James G. Wilcox, 500 Welch Bldg., phone R-8051.

Nelson Foundry Co., 6116 West Oakton St., Morton Grove, Ill., began operations in its new, modern plant at that address on June 1. W. K. Nelson is general manager.



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Those sleepless nights, worrying about too high production costs and lost orders can be avoided,— by installing Bartlett-Snow sand, mold and castings handling equipment. Individually engineered to your own particular requirements, Bartlett-Snow equipment enables foundry owners and plant managers to increase both the quality and quantity of their output. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better, reducing absenteeism and turnover. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

Bulletin No. 91
sent on request

THE C. O. BARTLETT & SNOW CO.

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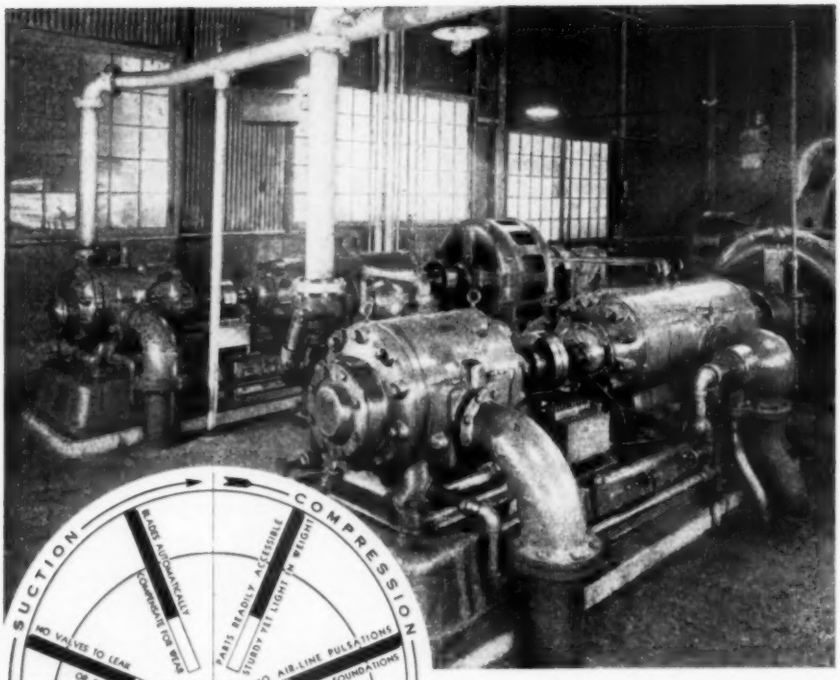
ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING



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Write for Bulletin C-5 illustrating and describing these machines.

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C-141

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

QUONSET HUTS HOUSE FOUNDRY

(*Continued from page* 83)

Cupola is lined to 32 in. and the present rate of melting is 2½ tons per day. Due to inability to secure charging equipment for the cupola, the firm designed and erected a unit which operates quite satisfactorily. It consists of 4 vertical legs made of heavy angle irons suitably braced and stiffened by other steel members which form a hollow square about 8 ft on a side. About 25 ft from the ground and level with the charging door sill a substantial platform is erected and in the center a pivoted jib crane is located. Boom of the crane is about 8 ft long reaching to the center of the cupola or sufficiently beyond the edge of the framework to prevent the bucket from striking it during hoisting. Round cone-bottom type buckets are used for metal and coke charges. Boom is swung to desired position from the ground level by means of a cable wrapped around a sheave wheel whose center is the mast or pillar on which the boom is attached.

Make Small Castings

At present only a few types of castings are made and include sections for a gas-fired steam furnace, and the finned cylinder and crankcase for a small engine or compressor. Molds are made by hand and on 3 jolt-squeeze, and 2 squeeze rollover machines. Finned cylinders are made in cores produced on a hand jolt-rollover machine. The cylinders are about 7 in. external diameter at the lower flange with a 4-in. bore, and about 12 in. long. They are poured in a vertical position with the large flange up. Gating is into the flange through two ¼ x 1-in. gates in the same vertical plane. Those are joined in an inverted V and attached to a pouring basin about 3 in. deep, 3 in. long and 1½ in. wide.

Gas furnace sections are made in green sand on the squeeze-rollover molding machines; one containing the cope and the other the drag pattern. Castings are approximately 18 in. wide, 3 ft long, and 3 in. deep with a ⅜-in. metal thickness. Casting is hollow; the central cavity being formed by a large flat core. An opening approximately 6 x 9 in. is located near one end of the casting which forms the flue for carrying off the gases of combustion. The casting is gated through that opening from a single sprue to which four flat runners ¼ x 2 in. are attached. Two of the runners feed into the legs or arms on each side of the opening while the other two runners at right angles feed into the main body.

Cores and core molds are made by

(*Concluded on page* 210)

"These machines are really good—That's why we bought the second one!"

The above terse comment of a mid-western nonferrous foundry owner is added evidence of user satisfaction, and the reason why over 51% of the more than 7,600 Royers now in service represent repeat purchases.

The Model NB-2 Royer shown at left was installed by this user back when wartime restrictions compelled us to substitute steel tires for rubber. This foundry, where efficiency and economical operation are combined in the production of non-ferrous castings, came out of the war with increased volume and consequently a greater sand conditioning requirement, and about a year ago (when rubber tires for all models of Royers had again become available), purchased the Model NC-2 Royer pictured above.

Get this book!

Royers assure properly conditioned sand at minimum cost, and quickly pay for themselves out of labor savings. One man with a Royer can prepare enough facing, backing or heap sand in a few minutes to keep a crew of molders busy for several hours. Royerized sand is cooled, open, thoroughly mixed and refuse-free —the kind of sand that results in better molds, fewer skids, run-outs and drops, and smoother finish castings that require less cleaning time.

There's a Royer model and size for every foundry requirement. Send for Catalog No. 744 in which you will find the logical solution to your sand conditioning problems.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

(*Concluded from page 208*)

hand and by machine, and dried or baked in a 2-compartment, gas-fired oven. Sand for the cores is mixed in a portable type muller with a detachable wheelbarrow which forms the base of the unit. The same unit is employed for mixing and preparing molding sand after each day's heat. At the present time molds are carried from the machines by hand and placed on the floor for pouring, but as soon as suitable roller conveyors become available they will be installed to eliminate worker fatigue.

Iron to pour the castings is transported in bull ladles suspended on the temporary monorail installation which may be seen in the illustration. That installation is about 60 ft. long and 15 ft. wide, and extends about 10 ft. beyond the door so that part of the straight section is in front of the cupola spout. That arrangement permits ladles to be brought from either side under the spout, or to be pushed completely around the loop. Later when steel is available the monorail system will be provided with permanent supports.

In addition to the foundry itself the 40 x 100 ft. hut houses a small office structure, a small machine shop, the air compressor equipment, and a locker and washroom for the employees. The latter contains showers, toilets and a circular wash fountain.

Pattern Vaults Require Planning

(*Concluded from page 71*)

for each company and valuations. It is not the intent of this article to discuss insurance features that may be had on request from companies issuing this form of protection. The purpose is rather to call attention to certain conditions under which the insurance policy might be put to test. They could be basic considerations for the granting of coverage and the establishment of rates.

The interest was evinced in the question, "Who shall carry the insurance on pattern equipment?" The answer, simply put, could be "the owner." But the owner does not have the patterns in his possession at all times. They are shipped by him to the foundry. The foundry stores them prior to and after the casting production. They are then shipped back to the owner. Most trade agreements state that the foundry shall not be responsible for loss of or damage to pattern equipment when caused by fire, or other causes beyond its control. The issue is somewhat controversial and depends on the company policy of both customer and vendor. A clear understanding should be reached at the placement of an order.

Pattern Storage Clerk: Importance of the pattern clerk's responsibilities is often misunderstood; yet on the thoroughness with which his duties are carried out depends the timely location and dispatch of patterns necessary to the production of castings.

On the arrival of newly made patterns or patterns shipped in, a careful check of the equipment to the blueprint should be made to see that it is all there before it is stored. A record card is promptly filled in and filed. Old patterns must be prepared for shipping or use. Other patterns received for storage after a casting order has been filled must be so recorded, the record filed and patterns stored. All pattern equipment must be checked to see that all loose pattern and corebox pieces are in place and all coreboxes included. Missing pieces, coreboxes or other equipment must be replaced or reordered.

Foreman or Superintendent in Charge

The pattern vault should be in charge of the pattern shop foreman or superintendent. If their duties do not permit this, the pattern clerk who is in charge of the pattern vault should be answerable to one of them. A closer co-operation will exist and the pattern shop executives' experiences will materially assist the pattern clerk in the fulfillment of his duties.

The pattern clerk should be acquainted with pattern and foundry theory, the customary pattern shop and foundry practices, and blueprint reading. His position is of a far reaching importance and should be so rated.

Acknowledgments—The author wishes to make acknowledgment to various companies for their co-operation in preparation of this article, including the C. O. Bartlett & Snow Co., Cleveland Trade School, Crucible Steel Casting Co. and Westinghouse Electric Corp., Cleveland.

Sources of Illustrations

Figs. 1, 3, 4—Westinghouse Electric Corp., Cleveland.
Fig. 5—C. O. Bartlett & Snow Co., Cleveland.
Figs. 6, 7—Crucible Steel Casting Co., Cleveland.
Fig. 8—Cleveland Trade School, Cleveland.
Fig. 9—Haynes Stellite Co., Kokomo, Ind.

Editor's Note: Another article by Mr. Cech, discussing pattern records, will be presented in an early issue.

American Well Works, Aurora, Ill., has purchased the Atlas Foundry, 2300 Bloomingdale Rd., Chicago. Present personnel will operate this foundry as wholly-owned division of American Well Works.

ELIMINATION OF CASTING DEFECTS

(*Continued from page 95*)

in the form of accurate records to the foundry.

Both of these conditions are essential for successful foundry operation.

Regarding the first: The casting inspector is responsible for maintaining the standard of quality for the foundry, and it may be said that the reputation of the foundry is very largely in his hands. It is his obligation to prevent all defectives from reaching the customer, regardless of how much is involved.

The chief value of casting inspection is in the fact that foundry scrap losses are limited to the combined loss on labor, material, overhead and loss on profit, provided that the castings do not leave the foundry. This loss becomes of relatively minor importance, however, when compared with the more serious and incalculable consequences of defective work reaching the customer.

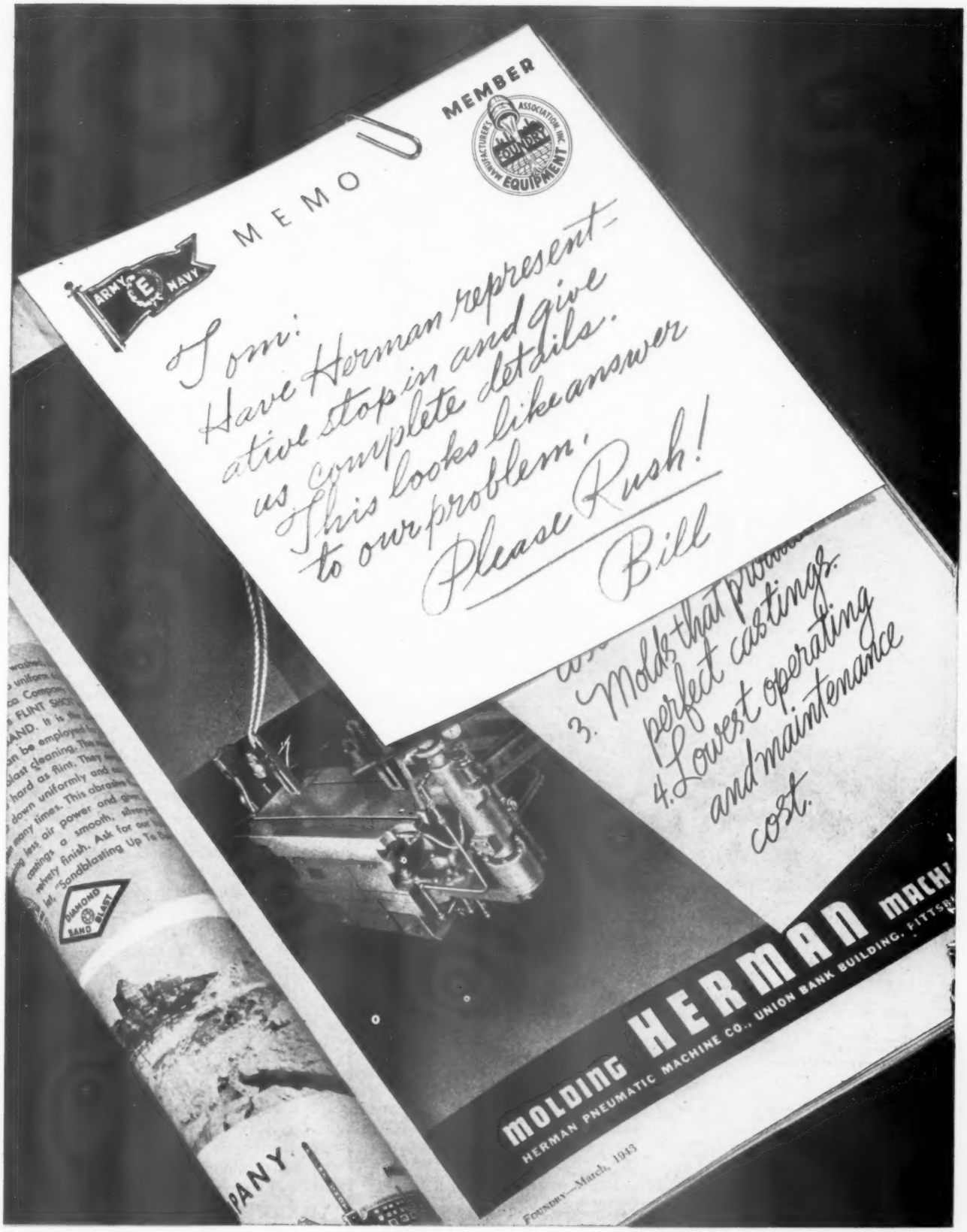
Foundry Industry Low Down

The foundry industry is comparatively low down in the chain of industrial fabrication. It supplies a semi-raw material and is intensely interested in the success of the processes to which it is subsequently subjected. It is therefore vital that if the foundry, as a unit or as an industry, is to survive, that defectives leaving the foundry be controlled to an absolute minimum. The penalty for failure to provide quality castings to the customer invariably means loss of business, not only to the single foundry but to the entire foundry industry. Too often in the past users of casings have been forced to use other materials because of general failure by foundries to meet physical, dimensional and surface specifications. The truth of this is apparent, since obviously the force of competition acts for the survival of the product best adapted to meet the needs of the case.

Having as its objective the maintenance of highest possible quality and workmanship, inspection policy should be based on a fixed standard rather than one which varies according to the customer. This not only is the safest policy, but it is the only method which will avoid the occasional mistake of reducing foundry scrap at the expense of the customer.

One of the principal functions of the casting inspector in any well organized foundry, large or small, is complete responsibility for routing, following, and finally submitting to the foundry data on trial or pilot castings before produc-

(*Continued on page 212*)



MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page 210*)

tion is approved. The pilot casting, even on relatively small orders, will more than justify its cost if carefully and thoroughly inspected.

Several accompanying illustrations depict standard inspection methods in an eastern Meehanite foundry on all pilot castings.

Fig. 12 shows a four-valve diesel cylinder head weighing 750 lb. This casting was thoroughly inspected for surface defects, outside dimensional accuracy and uniformity of surface finish. It was then routed to the machine shop, where it was laid out, completely machined, then water-tested and pronounced sound and satisfactory for assembly. In order to give the foundry and engineering department complete assurance that all internal dimensions were to specifications and that all internal passages were completely clean and free of sand or burn-in, the casting was cut longitudinally and cross-sectionally as shown. This procedure disclosed all surfaces to be clean and accurate, as shown in a quarter section of the same casting in Fig. 13.

The sectioned casting thereupon was sent to the inspection department, where a complete report was compiled from it by the inspector and forwarded to the foundry superintendent. The complete investigation, from pouring of the pilot casting to delivery of the inspector's report, required one week. One half, or two end sections of the casting, were held by inspection during the entire production run of the job, these sections being used as a guide for the cleaning foreman and castings inspector.

Fig. 6 illustrates a 6-cyl solid Meehanite crankshaft, 8 ft in length, 5 in. across pin and journal diameters, and weighing 920 lb. This casting was the pilot for an order of 80 units which followed. Again, following cleaning operations, the casting was thoroughly inspected for surface defects and dimensional variances. The crankshaft was then centered, indexed and completely laid out. Receiving assurance that dimensions were within required limits, inspection then had the casting sawed through all fillets or junctures of webs, pins, journals and flange. Webs were sectioned through their centers.

Sections Uniformly Sound

Fig. 7 shows results of this procedure. All sections were uniformly sound and solid, and there was no evidence of gas, sand, slag or shrinkage. The entire inspection procedure took three days and following submission of inspector's report, production was started and standards maintained without difficulty through the entire run.

Fig. 14 illustrates a half section of a casting which integrates the functions of cylinder, cylinder liner, cylinder head and cover frame. Production of the diesel engine using this casting was predicated on the ability of the foundry to provide the following properties: Minimum tensile strength 40,000 psi and minimum bore brinell of 200. These properties in themselves offer nothing extraordinary. However, examination of the casting will show that sections cover a range from ¼-in. in the frame, head passages and cylinder walls, to 2 in. on the firing face of the cylinder head. In addition, all passageways were required to be water-tight, and any slight dimensional discrepancy would scrap the casting. This casting posed the ultimate in molding, coremaking and metal control.

It was decided that, due to the extreme design, horizontal molding and pouring were the only means of possible success. A relatively cheap pilot pattern was made, and a small number of flasks produced to established standards. Three pilot castings were produced singly and were sectioned as shown. One half of each casting was cut in smaller sections

(*Continued on page 214*)

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Detroit, Mich.	The Foundries Materials Co.
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Hammond, Ind.	The Foundries Materials Co.
Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N.Y.	F. E. Schundler & Co., Inc.
Los Angeles, Calif.	Ind. Fdy. Supply Co.
Los Angeles, Calif.	F. E. Schundler Bentonite Co. (Inc. of California)
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Minneapolis, Minn.	Smith-Sharpe Co.
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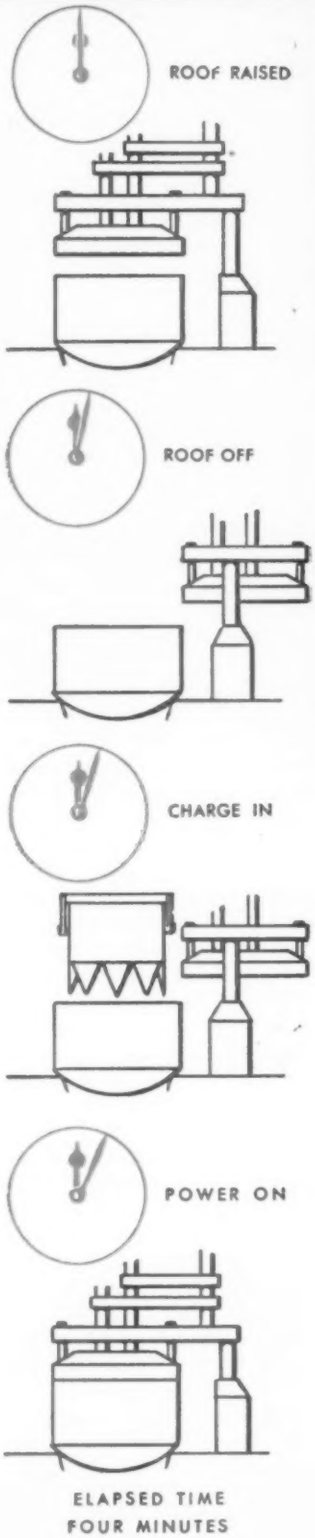
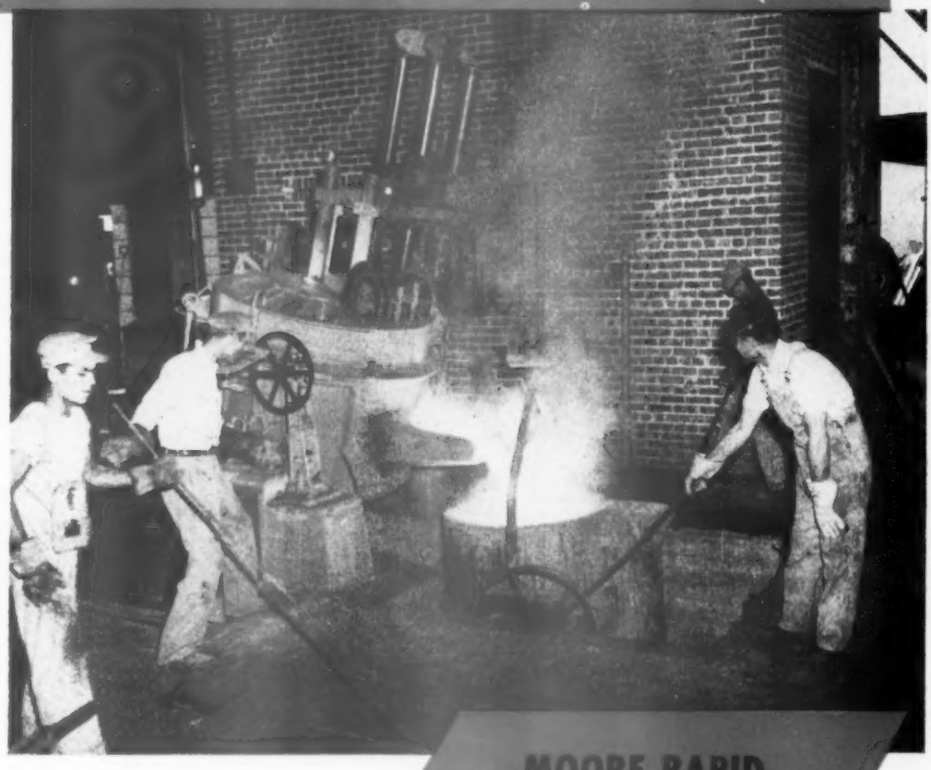




MOORE RAPID
Lectromelt
FURNACES

That time is money needs no proof. This is particularly true to operators of metal producing shops. And the time factor is one which has been given the utmost consideration by Lectromelt designers. Top-charging type Moore Rapid Lectromelt Furnaces require an average of only four minutes from the time the roof is raised, charging completed and the power on. This rapid and easy charging feature means immense saving of "down" time and more metal per turn. Lectromelts, by the incorporation of many patented features, cost less per ton to operate.

From every angle—Lectromelting is Economelting.

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PA.

(Continued from page 212)

to reveal all dimensions and internal surface conditions. Changes in design, molding and core practice were thereby revealed as necessary, and after these changes had proved satisfactory, permanent metal pattern equipment was constructed and the job established on a satisfactory production basis.

More than 2500 units have now been produced and all requirements maintained without difficulty. Pilot castings are periodically sectioned and matched against the original pilot, which has been preserved by inspection as a standard gage.

Inspection policy, based on such standards as these and maintained to a high degree of thoroughness, cannot help but produce a desire by all foundry personel to hold rejects to minimum limits.

The value of the second purpose of the casting inspectors' work, compilation of scrap and defective records for the foundry, is in most cases insufficiently recognized.

Data contained in these records serve the double purpose of: 1. Informing the management as to basic causes of scrap. 2. Enabling the foundry to arrive at the operating causes and to correct immediately the defects reported by the inspector.

In this connection, it is vitally important that clear indication be made of cause and effect. Where defects are not properly diagnosed and falsely recorded, much time and money is wasted on improper remedies, which in most cases tend to confuse all involved.

The most capable and thoroughly trained inspector cannot expect to function efficiently without frequent consultation with key personnel of foundry deparments. Any records should therefore combine the judgment, where necessary, of the foremen and inspector.

A general meeting for specific discussion of current scrap should include all formen and the inspector, and be held at least once every week. Through such meetings, all cloudy or inaccurate decisions are usually cleared up by general discussion.

Graphic records offer the inspector and foundry close observation of high production items over long periods of time. Such graphs or charts will definitely show trends and promote a greater degree of overall control.

Inspection should therefore be considered as one of the most important functions in the production of castings and, where intelligent policy provides capable personnel, is bound to justify its cost many fold.

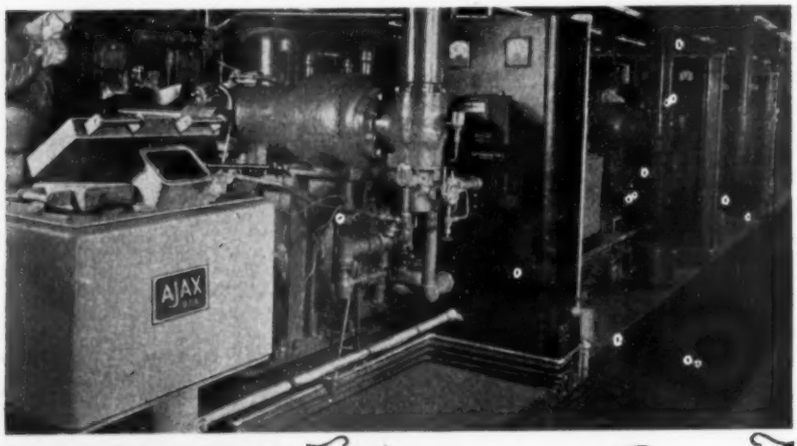
Effect of Scrap Losses—Consideration of defectives, up to this point, has been confined to their causes and the remedies to be adopted for their elimination. It is proposed to deal briefly with the *effect* of scrap, particularly in refercence to the economic position of the foundry. In general, defective castings affect each of the following: Foundry costs, foundry profits, foundry reputation and selling.

These are obviously interdependent and division is made only to emphasize their related importance.

In these days of regulated profit, constantly pyramiding labor and material costs and poor labor supply, a fixed volumetric percentage of scrap becomes a steadily mounting factor in increased costs. Under such conditions a 5 per cent scrap factor involves probably twice the cost of the same factor before the war. By the same token, this reflects a proportionate decrease in foundry profit.

Regardless of conditions, costs and profits, the effect of scrap on foundry reputation will not change. The foundry operating on a high percentage of scrap cannot have a good reputation. The foundry whose scrap percentage goes from low to high will lose its reputation very quickly.

Again by the same token, the foundry which operates on a high scrap basis cannot afford a salesman. Stated properly,



JOHNSON Seahorse
OUTBOARD MOTORS

OUTBOARD MOTORS contain a large number of aluminum die castings which provide uniformity in size, strength and quality, and avoid excess weight. High quality of castings is contributed by exclusive use of low frequency Ajax-Tama-Wyatt induction melting furnaces.

First . .

ALL ELECTRIC DIE CASTING PLANT

The photograph above shows a part of he Aluminum Alloy Die Casting Shop of the Johnson Motors Division of Outboard Marine & Manufacturing Company, located at Waukegan, Illinois, U. S. A. Thi is the first die casting plant in the world to use exclusively electric furnaces for melting and holding the metal to be processed in die casting machines

A large number of Ajax-Tama-Wyatt low frequency induction melting furnaces have been installed at this plant. The small illustration gives a close-up view of the 20 kw. holding furnace. Automatic temperature control, gentle movement of the metal (which prevents segregation) and amazingly low maintenance cost are the principal features.

AJAX ENGINEERING CORPORATION
Trenton 7, New Jersey

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

no salesman can afford to be associated with such a foundry, as he is permitted no foundation for selling, and is constantly in trouble with customers through failure to provide castings to promised specifications and standards.

Before concluding, there are two more illustrations of castings requiring the ultimate in control, which shall be described briefly.

Fig. 16 illustrates a 16-cyl, V-type diesel engine main frame. This casting is 12 ft long, 55 in. wide and 46 in. deep. Rough weight is 5700 lb and finished weight approximately 4900 lb. Maximum metal section is ¾-in. Minimum and prevailing section is ¼-in. Minimum tensile strength in the casting is 40,000 psi. This unit cast in Meehanite weighed less and cost only half of its prototype in a weldment.

Finally, Fig. 15 shows a 6-cyl diesel main frame, 9 ft long, 4 ft deep and 30 in. wide weighing 2300 lb in the rough and finishing at 1800 lb. Maximum metal section is ½-in., minimum section $\frac{7}{16}$-in. This casting again cost and weighed less than its welded cousin, and provided better properties for its application than a weldment possibly could have done.

Production of castings like these require control all along the line. Control in flask standards, control in pattern standards, control of materials, control in melting, control in cleaning and finally control in inspection.

Management holds the key to the foundry's success as a unit, as a division and as an industry. The brains and the tools for success are abundantly available. Continued toleration of high losses through defective and scrap castings will keep foundries in the back-alleys of the industrial world. Aggressive and concerted campaigns to reduce defectives and scrap to the lowest possible minimums, will help them realize genuine acceptance and security. As a result, technological advancements heretofore undreamed of will be developed and open the doors of markets now closed because of "unsuitability."

Thus the whole matter of the progress achieved by the foundry will be determined largely by its attitude toward the problem of defective castings and the amount of energy applied to their elimination.

Adds Branch Office

Independent Pneumatic Tool Co., Chicago, has opened a new branch sales office at 220 West Seventh St., St. Paul. It is managed by Joseph A. Bell, sales representative of the company in that area for the past six years. The office will serve all of Minnesota, eastern North and South Dakota, northwest Wisconsin and the upper peninsula of Michigan.

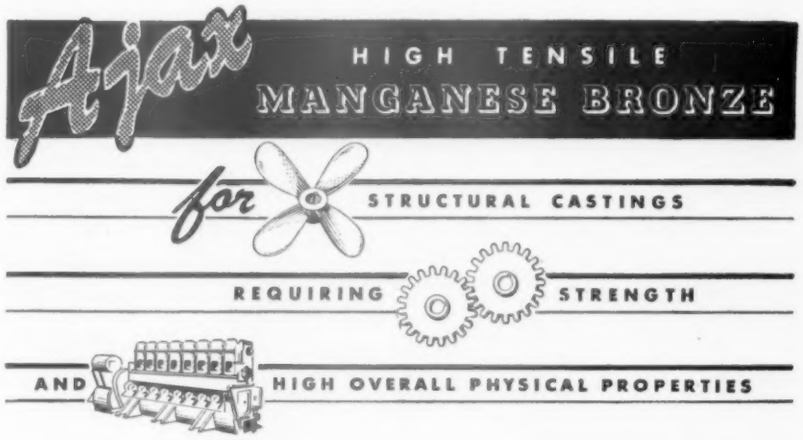
VENTILATING SEPARATORS, BREAKERS, SCREENS

(*Continued from page 97*)

must be governed in his design by existing conditions.

Core breakers are sources of very heavy dust loading, and each individual installation must be studied before the air volume can be established definitely. Breakers also are used on the tailings from screens. However, these are not so difficult to ventilate as the load is relatively small compared with the screen load. It is not uncommon to find foundries casting parts using a dry sand core running upward of a half ton in weight. Usually such cores are passed through the breaker for recovery of the rods and reduction of the sand to a point where it can be handled for either disposal or reclaim. As a guide in establishing the air volume for rotary breakers a figure of 150 to 250 cfm of air per sq ft of cross section of the breaker may be used.

Fig. 3 shows a common method of hooding the rotary breaker. The hood generally is part of the machine and fur-



Designers and foundrymen, charged with the gigantic responsibility of specifying engineering materials for the products of a world once again at peace, are closely scrutinizing the widest range of selectable materials ever offered to industry. Of primary importance is the direct consideration of Performance; and, decisions thus made must, of necessity today, be tempered with new emphasis on total Cost. An alloy, therefore, which measures high in strength, toughness and corrosion resistance—which has cut its eye-teeth long ago on marine castings and fittings, engine bases, pump bodies, gears, etc.—yet permits the foundryman to produce solid castings perfectly free from surface imperfections and which leave the sand bright and clean—and will take a mirror-like polish —an alloy like that deserves investigation. A metal of such calibre is Ajax High Tensile Manganese Bronze. Produced under rigid laboratory standards to constant formulae, this Ajax ingot has established recognition as the highest quality manganese bronze available. Write for complete data NOW.

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nished by the machine manufacturer. In the illustration the rotary drum is shown at 1. The delivery conveyor is shown at 2; the take-away belt at 3 beneath the hopper 4; the iron removal belt at 5 below the delivery end of the rotary drum; the dust hood at 6 and the air take-off at 7. Air enters the drum from below. The side sheets of the hood come down well on the sides and through the open area at each end.

Breakers in operation produce the maximum dust for a portion of a minute following the dropping in of a mold, and then taper off to practically no dust before another load goes in. This makes it necessary to design for the maximum rather than the average condition and accounts for the seemingly high air figure given. If the loading of the breaker could be made more uniform perhaps a lower air figure could be used. Since the load comes direct from the shakeout, the loading corresponds closely with the shakeout operation. This close tie-in with the shakeout also accounts for the temperature of the exhaust taken from the breaker which accounts also for the large volume of fines thrown off at this point.

Most breakers or pulverizers are capable of almost complete enclosure by the sheet metal hood, allowing the air inlet to come at the bottom or discharge point of the machine. In ventilating such machines it is safe to figure an inlet velocity of 300 fpm through the total open area. This will admit sufficient air to carry away the dust produced and avoid possible contamination of general atmosphere in the vicinity of the machine.

Screens in the foundry sand conditioning systems are of two general types, rotary and vibrating. Object of the screen is to remove nonmagnetic materials, particles of wood, rags and other materials which are likely to get into the shakeout sand and, in the case of the rotary screen, to assist in breaking up lumps of sand.

Regardless of the type of screen used ventilation is very necessary, as the action of the machine is to shake the dust and fines out of the sand. Usually the screen is installed above or near the sand storage bins and either discharges the screened sand direct into the bin or onto a belt conveyor, which in turn discharges into the bin. This means that the screen generally will be found in the upper portion of the sand conditioning tower of the plant.

Remove Fines From Sand

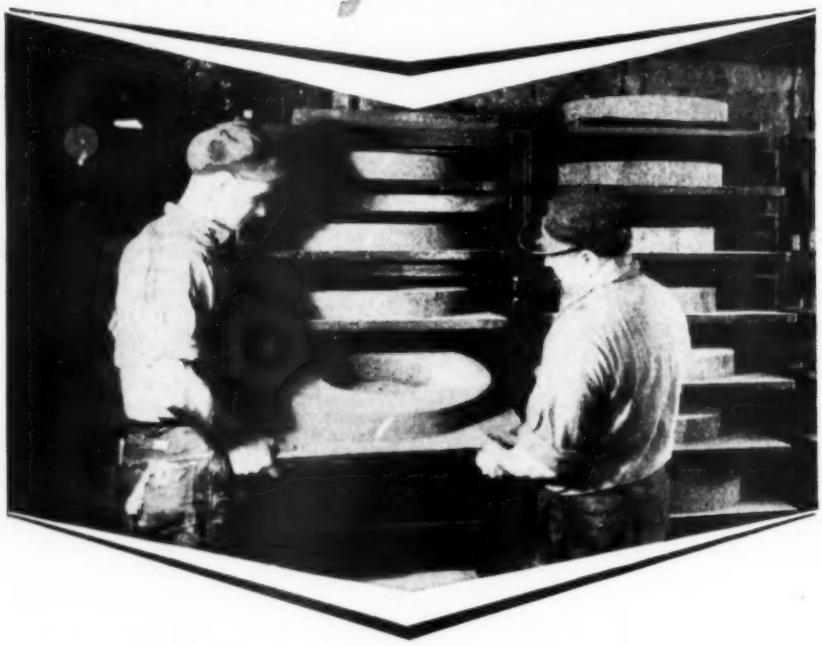
Some engineers believe that the screen presents an ideal point for pulling out fines where fines control in the sand is essential. Fines can be removed at this point to a certain extent. However, it is usually best to treat fines control as a separate operation and use designed equipment for the purpose. In this article the screen is treated not as a fines control point but rather as a point from which it is only necessary to remove the dust generated.

Fig. 4 illustrates a common type of vibrating screen which may be single or multiple deck. In the design and installation of the hood, due regard must be given the maintenance feature of the screen. Screens wear and must be replaced, or a change in casting and molding practice may necessitate a change of screens. Vibrators are subject to wear and must be replaced after a period of time and certain adjustments must be made.

In Fig. 4 replacement and adjustment have been taken care of by providing a large hood placed over the top of the screen so that the dust can rise freely into the chamber thus formed and be removed by the suction applied to the exhaust connections. The hood is 16 gage metal adequately ribbed and reinforced with light angle iron to provide a substantial structure. The exhaust connection is at the top and fresh air inlet at

(*Concluded on page 218*)

"I do the job **faster...**"



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They last longer—Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

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Keller Pneumatic Rammers are engineered to provide a faster, more satisfactory method of ramming up flasks and core boxes than is possible with other methods. Pit molds, clay, sand, etc., are all easily handled with these efficiently designed tools.

1. Short Head Bench Rammer. *2. Floor Rammer.* *3. Straight Handle Bench Rammer.*

Size No. 4D especially designed for small bench work. This rammer may be equipped with an inverted head and lever, extending down the body of the tool. One hand control results, with evident advantages in the use of the tool. The fast, light blows of this rammer action are fully under the control of the operator at all times. On Page 50 of our new Catalog Number 12, you will find complete specifications for ordering Keller Sand Rammers.

Size No. 4D with straight handle and throttle. Suitable for larger castings than are usually rammed on benches. Same tool can be fitted with an extension pipe between the throttle handle and the head of the tool to provide a light floor rammer.

Size No. 7D. This type is a heavy-duty floor rammer. Heavier and more powerful, they are designed for fast, efficient ramming of larger, heavier flasks. The throttle arrangement permits full, positive control of the impact at all times and through all desired ranges of impact force.

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(*Concluded from page 216*)

the bottom.

Fig. 2 shows another type of hood often used on this type of screen where the dust is withdrawn from below the screen in the single screen job and from between the screens in a multiple screen. This type of hood may give trouble by pulling too much good sand, and provision for adjustment of the air volume must be provided. Usually this consists of a damper in the suction pipe which is set under operating conditions and then secured in place so that it cannot be moved thereafter without disassembly.

Regardless of the type of hood, the volume of air which must be removed to provide adequate ventilation is about the same. Observation and checking many installations indicate that within reasonable limits of dimensions of the screen a figure of 75 cfm per sq ft of screen area will be ample to give satisfactory ventilation. For screens smaller than 3 x 5 ft the figure should be increased to 100 cfm per sq ft of screen area and for screens larger than 5 x 10 ft the figure should be decreased to 60 cfm per sq ft of screen unless, of course, the state code specifies otherwise. These volumes are based on the area of the screen frame rather than the exact area of screen cloth in the device.

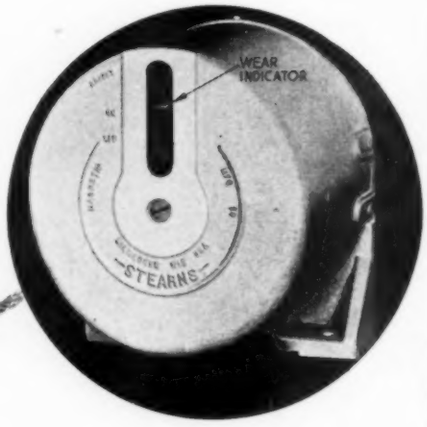
Fig. 5 illustrates a common method for hooding the rotating screen whether of the hexagonal or round end design and whether straight or tapered. The hood wraps around the screen at a reasonable distance and extends down the sides to join on to the hopper or bin below, as the case may be. Air is admitted through openings cut along the sides at the bottom, plus air which enters through the clearance opening at the ends.

The air volume for ventilation of the rotary screen is calculated the same as the vibrating screen, except that the area is taken as the projected area of the screen diameter. For example, a screen 5 ft mean diameter and 10 ft long would have a projected area of 50 sq ft, and the air volume for ventilation would be 50 x 75, or 3750 cfm total.

Where the screen is installed above the sand storage bin it is wise to absorb the ventilation of the bin in the ventilation of the screen, as the dust-carrying capacity of the air will not be overtaxed by the screen alone. Where the screen delivers to a belt conveyor through a hopper placed below the screen, this hopper must be ventilated and possibly the distribution skirt on the take-away belt should have an exhaust pipe connected to it, unless this can be drawn away by the screen ventilation.

The screen is provided with a refuse discharge. In the case of very lumpy sand, the discharge is fed through a crusher which also should be ventilated as previously described.

FOR BETTER BRAKE Performance



Stearns MAGNETIC offers LARGER BRAKE for HEAVIER LOADS

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PULLEYS—CLUTCHES—SEPARATORS—DRUMS—MAGNETS

Book Review

Symposium on Magnet Particle Testing, 122 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia 2. Price $1.25

Comprising eight technical papers with discussion as presented at the Philadelphia district meeting of ASTM early last year, this book covers the application of magnetic particle testing in a number of industries. The introduction discusses the wide application of this method of testing and is followed by papers on a description of equipment, advantages and disadvantages of the test, utilization of the test by railroads, and the testing of aircraft parts. Other papers discuss specifications and procedures, testing of castings, application to forgings, and testing of miscellaneous parts. The book also contains two ASTM specifications for magnetic particle testing and inspection of commercial steel castings and heavy steel forgings.

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RECRUITING AND TRAINING FOUNDRY ENGINEERS

(*Continued from page 96*)

Our professional obligations are several. First, we must have an ever-alert, well trained, well informed teaching staff. Science is changing so rapidly that the effective teacher of a scientific subject cannot rest upon the knowledge gained during his period of preparation for teaching. This generalization applies to all teachers, but the demands upon science teachers are imperative.

Not only must the science teacher be "up to the minute" in his own knowledge, he must also know the newest and best methods of teaching science.

Beyond the teaching of science subjects is the importance of teaching the scientific attitude. The core of progress in science and invention is the inquiring mind. Science teachers are not only imparters of knowledge; they should also be devoted to stimulating in their students that intellectual curiosity essential to stretching the mind to encompass all achievements possible. In seeking to develop this quality, teachers are dealing with the essence of all education, the search for truth in all fields of learning. Because of the quick interest of young people in science, science teachers have a proportionately greater opportunity to achieve this educational goal.

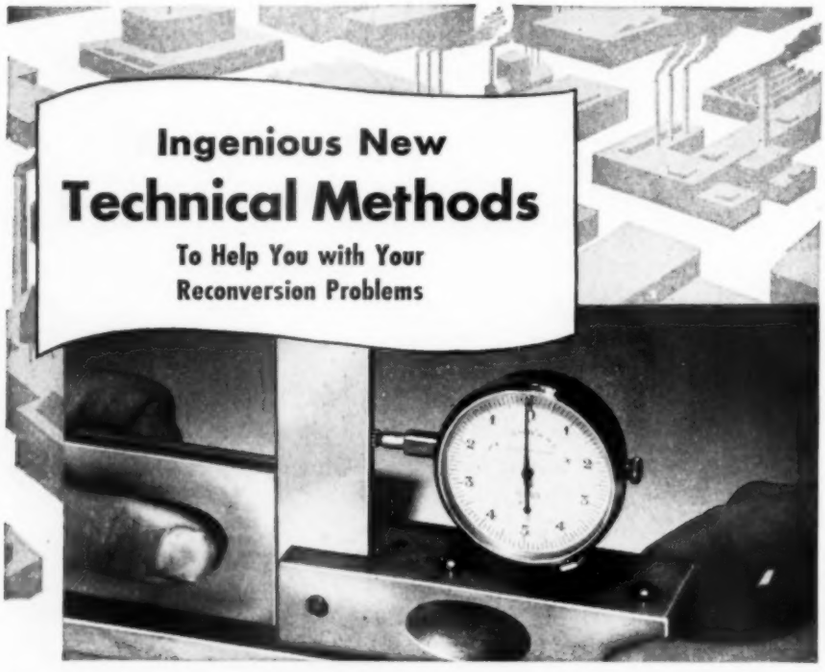
Knowledge of science and appreciation of the scientific attitude are still not enough. The third element in effective science teaching is the scientific method. The hard, cold handling of materials, unlimited by inhibitions of emotional analysis or the frailties of human bias, is the method of the scientist. The student must learn the laws of mathematics as a medium of expression and he must learn the qualities of exact test-tube thinking.

Obligation To Help Students

If we have an obligation to provide this kind of vital, significant teaching in science, we also have an obligation to help students to learn to use the tools of science effectively. To attempt the teaching of modern science with obsolete equipment and antiquated materials should no longer be permitted. True, certain principles of science can be illustrated with obsolete machines and equipment, but we are failing to prepare the student to make the adjustment to the vocational and professional requirements that he will meet if we do not give him contact with the tools that he later must use. Our school equipment needs in universities and high schools, as well as in the elementary grades, are well known. It is to be hoped that in disposal of the present surplus property of the federal government the gap may be partially filled. Certainly no better use of the material can be made than to give it to the agency that is charged with the responsibility of introducing young America to science and science achievement. This equipment, in turn, however, will quickly become obsolete. We must adopt a new concept in educational budget-making which will place the same emphasis upon adequate means of instruction as is now placed upon personnel.

I array these factors in the task of educational institutions in the teaching of science, technology and engineering as a background for a discussion of the problem that immediately concerns the foundry industry. Foundrymen share with the other sections of the engineering profession a deep concern about the shortage of trained young men. They are eager to take steps to ensure a continuing flow of well trained and able young engineers into foundry work. Their task is the more difficult because entering into competition with other

(*Continued on page 222*)

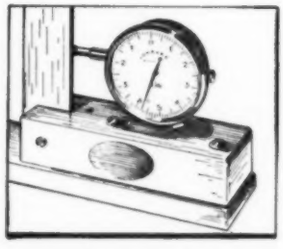


New Micro Square Instantly Checks Right Angles to One 10,000th Inch!

Ideal for precision testing, the Acro Micro-Sine Square quickly and accurately checks right angle work to 1/10,000th inch within a given distance. Its standard indicator dial instantly registers error, location of error, and amount of correction required. Designed for tool and die shops, machine shops and testing laboratories, it also provides a standard for checking master squares, tri-squares and tools.

The Acro Micro-Sine Square is very simple to operate, saves hours of time. Made of hardened tool steel, in ground and lapped precision construction. Available in two types: (1) Standard precision gauge in tenths, (2) Lever indicator in thousandths. Both complete with master checking blocks and carrying cases.

On precision jobs, requiring a static position and mental alertness, workers undergo nervous tension which often results in fatigue. Tests have shown that the act of chewing helps relieve tension—helps workers stay alert, thus increasing their efficiency to do more accurate work. For this reason, many plant owners urge workers to chew Wrigley's Spearmint Gum on this type of job.



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Juniata has a fusing point of 3100° F. Highly permeable. Promotes smoother finishes, better casting surfaces. Can be furnished in A.F.A. grain size finenesses from 60 to 105. Dependable deliveries in any quantity—raw or dried.

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(*Continued from page 220*)

branches of the engineering profession they are handicapped by the traditional association of grime and smoke and generally unpleasant working conditions with the foundry. I do not believe that young engineers are afraid of hard physical work, but quite justifiably they do not wish to be sidetracked into a job situation that does not seem to challenge them to make the best use of their professional abilities. A well known engineer has described the problem in these words:

"In the history of the foundry industry, too many engineers have become discouraged and subsequently discontinued their foundry careers because management was concerned principally with immediate production problems and not interested in building an organization to meet future challenges. Science will play a much greater part in the developments of the future than that part taken by the artisan in the present plan of advancement. In this respect, top management becomes the instructor for submanagement and unless he carries out his part of the program of 'Youth Encouragement,' our educational efforts will be altogether lost or practically nullified."

If the foundry industry is to enter into successful competition for the young engineers of tomorrow three steps, I believe, must be taken.

First, the industry must in some way assist educators, vocational counselors, and all others who are in a position to influence the thinking of young men vocationally, to understand that there is an opportunity for engineers to enter the foundry business at the level of engineering work. It is now clear to a student engineer at just what level the engineer operates in the foundry industry. Too often the young graduate has stored away his college training to enter a foundry and been assigned to the sand pile, the charging floor, or the wheelbarrow—without any assurance that this kind of work experience necessarily contributes to his possible later success as an engineer and without any guaranty that the assignment will be only a brief apprenticeship. A way must be planned to bring the engineering graduate into the foundry business at an engineering level and not at that of a laborer or undefined apprentice.

Develop Definite Program

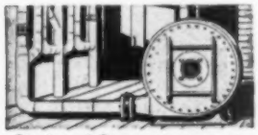
A second task for the industry is the development of a program of interpretation which will clearly and effectively present the professional opportunities in foundry engineering. Certain professions have met the same kind of personnel shortage with which the foundry is concerned by adopting such a program of direct recruitment in the schools and colleges. Medical technology, retailing, pharmacy, and nursing have been particularly successful in this kind of endeavor. In these specific instances, the organized profession has analyzed clearly and presented in a popular way the opportunities for young people in these professions. Then they have carefully planned ways and means of taking that message to the high schools and college placement offices and training centers. The results have well justified the individual effort, although at times we may feel that such unco-ordinated recruiting may result in a maldistribution of personnel service later.

It will do no good, however, to undertake this kind of task for foundry engineering unless it is accompanied by a clear evidence from the profession that the foundry working conditions are as favorable as obtained in other branches of engineering. In most colleges and universities where there is a foundry for instruction purposes, I am told, the student finds a rather unattractive laboratory, a shop not characterized by any evidence that the industry has applied

(*Continued on page 224*)

FREE YOUR FOUNDRY AIR

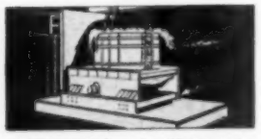
Sturtevant Core Oven Fans—handle dirty, dust-laden air with no loss in efficiency. Shafts cooled by special "heat-slinger."



Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or gas burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.

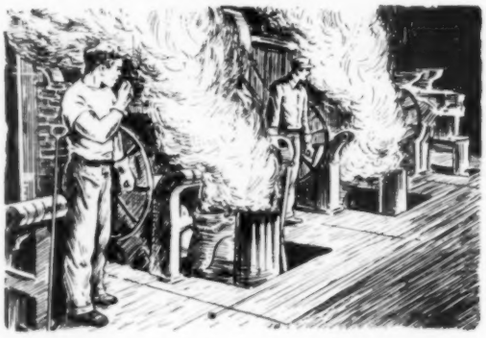
Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sandblasting operations.



Sturtevant Foundry Shake-out Systems—completely control dust and fumes, increase worker efficiency and equipment life, cut down maintenance.

From Dust, Fumes and Smoke With Sturtevant Fume Control



Why handicap your workers and equipment in poorly ventilated buildings, especially where firing, pouring, snagging or tumbling operations are involved? A Sturtevant Fume Control System is easily installed, and pays for itself many times over in uninterrupted production, lower maintenance costs, better employe morale.

For example, Sturtevant Fume Control can be used to rid furnace rooms of smoke and carbon dioxide fumes from freshly fired core ovens—to eliminate unhealthy gases and concentrations of dust in the air—to cut down on furnace-radiated heat. Whatever your fume control problem, Sturtevant engineers can help you plan the particular apparatus or ventilating system to overcome it.

The nearest Sturtevant branch office will furnish you with full information—or, write the B. F. STURTEVANT COMPANY, *Division of Westinghouse Electric*, Hyde Park, Boston 36, Mass.

STURTEVANT PRODUCTS
DESIGNED TO MEET YOUR FOUNDRY NEEDS

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
Westinghouse ELECTRIC

RANSOHOFF CLEANING MILLS

AUTOMATIC STAR RETURN

Here's a report by a Ransohoff Field Engineer of what a 60" x 72" END-LOADING END-UNLOADING MILL is doing:

"This installation is another proof of the efficiency of RANSOHOFF CLEANING MILLS and how these parts can be run in an end mill on a production basis. They came out and looked swell. The PLOW SHARES in particular are a fussy piece as they have a chilled edge and are very easily nicked. *They came out of the RANSOHOFF MILL absolutely OKEH.*

"The operator raises the power loader just a bit above the horizontal and eases the castings into the mill. *They never get breakage in the mill or in the discharge.*

"They put through 40 batches in 8 hours *or an average of 12 minutes* per batch.

"The head engineer told me he wished that all their equipment was as good as RANSOHOFF'S."

We'll be glad to supply name of owner and the man who wrote this report.

LET US HELP YOU SAVE 30% TO 70% ON YOUR CLEANING COSTS

RANSOHOFF CLEANING MILLS ARE EASY . . . GENTLE...ECONOMICAL...NOT SELF-DESTRUCTIVE . . . NO MANUAL HANDLING OF STARS.

N. Ransohoff, Inc.

Township and Big 4 RR **CINCINNATI 16, Ohio**

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION

Engineering Service

new plant design
surveys
modernization
mechanization

Management Consultation

incentive plans
job evaluation
standards
cost controls

LESTER B. KNIGHT & ASSOCIATES
INC.
Consulting Engineers
120 S. LaSalle St. • Chicago 3, Ill.

(*Continued from page* 222)

modern and scientific methods to the product made or to the working conditions under which it is produced. Judging by these foundries, the student would deduce that this laboratory has to do with an industry with poor working conditions, low pay, and an unimaginative concept of the application of engineering principles.

One will find that the foundry is usually on the top floor of the school, or in a remote building, even though such a setting seems to be a strange place to put the laboratory for a heavy industry. If he asks why this location was selected, he will be told there is so much dust and smoke in the laboratory that it is necessary to place the room as far away from the remainder of the building as possible. It is apparent that if our student is a clear-thinking prospective engineer, he will wonder why in this day of machanical handling of raw materials and methods of ventilation, this anomaly has to be.

Student Gets Unfavorable Impression

When he gets into the laboratory he will ask more questions. The room will probably be cold and drafty, small, and with insufficient heat if the season is winter, if summer, the room will be unnecessarily warm. He will see a lot of piles of sand on the floor, with shovels in evidence, too. He will notice heavy wooden frames handled by hand, and a riddle that also must be shaken by hand. The molder may be an artist in using the sprinkling can, but the engineering student will see this relic as evidence of an unscientific approach to moisture control. The cupola will interest him, but he will be disappointed when he is told he will be able to use it only once or twice a semester because it takes that long to make sufficient molds. When he gets to the charging floor, he will see a pile of scrap iron, coke and stone and no means of handling these maaterials except wheelbarrow and shovel.

Long before our prospective student has completed his visit to the foundry, he will come to the conclusion that if this laboratory represents the foundry industry, that industry is a long way behind the times.

In this description I am suggesting the third task of the foundry industry—to make it possible for schools and colleges to present a laboratory to students which is modern in every detail and represents not only the best foundry practice as now found, but also some of the improvements in foundry practice to which the profession aspires. In vocational guidance, we deal with the emotions of students as well as with their minds and we must

(*Concluded on page* 226)

WOOD AND METAL PATTERNS BY

HOWARD

"LIKE PEAS IN A POD" . . . Prompt service is now available on Howard's three spindle Keller machines for quickly reproducing many exact duplicate patterns from a master.

THE castings you need can be no more accurate than the patterns from which they are made. With this in mind, more and more engineers and designers are specifying "Patterns by Howard."

The complete foundry facilities at Howard can provide you with wood and metal patterns to meet your most exacting demands.

If yours is a problem of the right wood or metal patterns we'll be glad to assist you to a solution. Howard facilities are available for making a single pattern or many and, in addition, to produce aluminum, magnesium, brass, bronze or semi-steel castings in all sizes and quantities.

NEW TEMPLATE AND MODEL SHOP
This new shop, featuring the finest in woodworking machinery and skilled craftsmen, is equipped for, and producing models and templates for body building in the automotive industry.

HOWARD FOUNDRY COMPANY
General Office: 1700 N. Kostner Ave.
Chicago 39, Illinois

ALUMINUM MAGNESIUM BRASS BRONZE SEMI-STEEL

Castings and Patterns by HOWARD

when you want Speed-
when you want power-

. . . in your job of grinding, polishing, buffing, sanding, drilling, reaming, screw-driving or nut-setting, you want a Strand Flexible Shaft machine, because a Strand will do it faster, better, and stand up to it longer.

Strand Flexible Shaft machines provide constant speeds with greater operator convenience. Hundreds of attachments easily interchanged—125 types and sizes—models include vertical and horizontal type machines from ⅛ to 3 h.p. Distributors in all principal cities.

Send today for catalog showing complete line

Strand FLEXIBLE SHAFTS
N. A. STRAND & CO.
5010 NO. WOLCOTT AVE. CHICAGO 40, ILL.

ELIMINATE SWAB,
Brush and Spray Can and
IMPROVE Production
and Quality of Work

BLACKEN MOLDS

with the
MURPHY PISTOL SPRAYER

Blackening reaches hidden pockets as well as all accessible surfaces and is driven into the pores of the sand by air pressure. Molds are blackened faster! Castings peel better! Work comes cleaner!

SATISFACTORY PERFORMANCE GUARANTEED OR MONEY REFUNDED

Trigger control means effortless handling and economy of air consumption. Used for Silica wash, oil, water or any liquid material. Used for sand blast cleaning of permanent molds and castings. Without suction hose the Murphy Pistol Sprayer becomes a perfect blow gun, used to advantage for the cleaning of motors and machinery.

Prices, complete with Suction Hose and Sinker

Pipe Size	Price FOB Hamilton, O.
1/16"	$10.00
1/8"	10.00
1/4"	10.00
3/8"	12.00
1/2"	15.00

(There has been no increase in these prices since 1910).

If your dealer cannot supply you, order direct . . . literature on request. Address Dept. A-11.

GUARANTEED COMPRESSED AIR PRODUCTS
AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS
JAS. A. MURPHY & CO.
HAMILTON, OHIO, U.S.A.
Moisture Elimination Up To 3000 Pounds Per Square Inch

(*Concluded from page 224*)

remember that the other branches of engineering have pretty well succeeded in putting into the hands and at the disposal of students the kinds of equipment that are challenging, interesting, and related to the work that they will later be called upon to do.

The foundry industry, we are told, is the fifth largest in the United States and consists of approximately 4500 individual producers employing over 750,000 people, which in 1942 produced over 20,000,000 net tons of finished products valued in excess of $3 billion. Size alone is only a partial index to the foundry industry. Its wartime resourcefulness indicated beyond all doubt that it is alert to change and aware of the importance of research and new methods in the growth of the industry in the future. It is not too much to expect, then that the industry should recognize the essential importance of trained manpower in the development of its long-range programs and seek to present its work in appropriate setting for the engineer whom it wishes to attract.

Foundryman's Wage Is Above Average

Average weekly and hourly earnings of ferrous foundry workers for May were higher than averages for both the all manufacturing and durable goods groups, according to a survey made by the U. S. Department of Labor, Bureau of Labor Statistics. Hourly rates of foundry workers for gray iron and semisteel were 117.9c; for malleable iron, 118.5c, and for steel, 124.0c, compared with 114.8c for durable goods and 107.1c for all manufacturing. The latter figure represents a new high for factory workers.

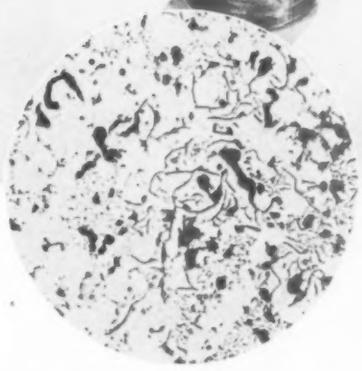
Malleable Founders Discuss Practice

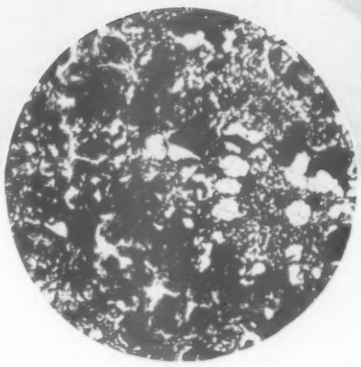
Central section of the Malleable Founder's Society held a shop practice meeting July 26, at the Deschler Hotel, Columbus, O. The subject for discussion, "Melting Practice," also was the topic at two previous sectional meetings held by the society—June 7 at Chicago and June 14 at New York. The discussion, led by James H. Lansing, consulting engineer for the society, dealt with various phases of duplex melting, direct air furnace melting, fuel consumption, use of refractories, etc.

Gebco Mfg. Co. plans construction of an addition to its foundry at 3307 East Pico Blvd., Los Angeles, 30 x 40 ft., to cost $6000.

Test Data on Foundry Grade *G-IRON

Photomicrograph of G-Iron showing grain structure. 100 diam. unetched.





Photomicrograph of G-Iron showing grain structure. 100 diam. etched.

✻ G-IRON is graphitized pig iron. A patented blast furnace process refines the grain structure of the pig—and this refinement follows through to the final casting. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps to overcome internal shrinkage and porosity between thin and heavy sections.

A minimum of 35% G-Iron pig in the cupola mixture is necessary to obtain the full advantages of these benefits.

Final casting results of this test bar made from G-Iron pig and cast iron scrap—using no steel scrap—are:

2.12 Silicon	3.56 Total Carbon
.089 Sulphur	.44 Combined Carbon
.404 Phosphorous	30,070 Tensile
.68 Manganese	179 Brinell

TONAWANDA for sound castings

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

New EQUIPMENT and SUPPLIES

(1)—Laboratory Pump: Laboratory Equipment Corp., Benton Harbor, Mich., has developed a circulating pump designed to eliminate inconsistant results and to increase the accuracy of the rapid volumetric carbon determination method. The new pump maintains identical temperatures of the cooling and leveling fluids in the carbon determinator regardless of temperature fluctuation in the laboratory, thus eliminating errors caused by temperature differences. The pump is so designed that the fluids do not come in contact with contaminating materials; also the temperature of the fluids is not affected when circulating.

(2)—Compressor: Davey Compressor Co., Kent, O., is producing a new line of industrial air compressors designed for installation in individual plant departments as replacements for a large central compressor system or as supplements to a central system where existing capacity is inadequate. Individual units may be connected together to provide a reserve for overpeak loads, or maintain service in case of breakdowns. The new units come in 60, 105, 160, 210 and 315 cfm sizes.

(3)—Stacker Truck: Automatic Transportation Co., 121 West 87th St., Chicago 20, has introduced a motorized hand truck counterpart of a fork lift and high-lift platform truck for use where weight, size, speed or cost make the larger units impractical. Known as the Transtacker, it is completely electric powered with motorized hydraulic lift, and is designed in four models for handling all types of pallets and skid platforms. Load capacities range from 2500 to 4000 lb, and platform and forks raise to heights of 68 and 64 in., respectively. Overall height is 83 in. The new units have two buttons on the guide handle controlling forward and reverse power, while a third operates lift. Horizontal speed and the brake are controlled by vertical position of the guide handle.

(4)—Belt Grinder: Porter-Cable Machine Co., Syracuse, N. Y., announces a new light, narrow belt grinder attachment, type N-2, for light burring and grinding operations such as light griding of flats, arcs, angles, gear burring, weld grinding and cleaning operations. Composition materials, plastics, steel, iron, aluminum, wood and glass are easily ground and surfaced. The attachment is furnished without motor and is quickly attached to a bench type wheel grinder to which a resilient contact roll has been fitted. Complete assembly is 27 in. high and 2½ in. wide. A 6 x 7 in. T-shape base is drilled with three holes for mounting to bench or table. Platen size for flat grinding is 2 x 4 in. Resilient contact rolls, 2 x 6 in. or 1 x 6 in., can be furnished. With an endless abrasive belt, 2 x 48 in., the attachment can be used in the vertical or horizontal position or at any angle within 90°.

Molding Alloy: Trethaway Associates, 37 Wall St., New York, has developed a new alloy for use as a molding material for casting plastics, rubber and other materials. It is recommended for molds used to cast wax patterns employed in the investment casting process.

(*Continued on page* 230)

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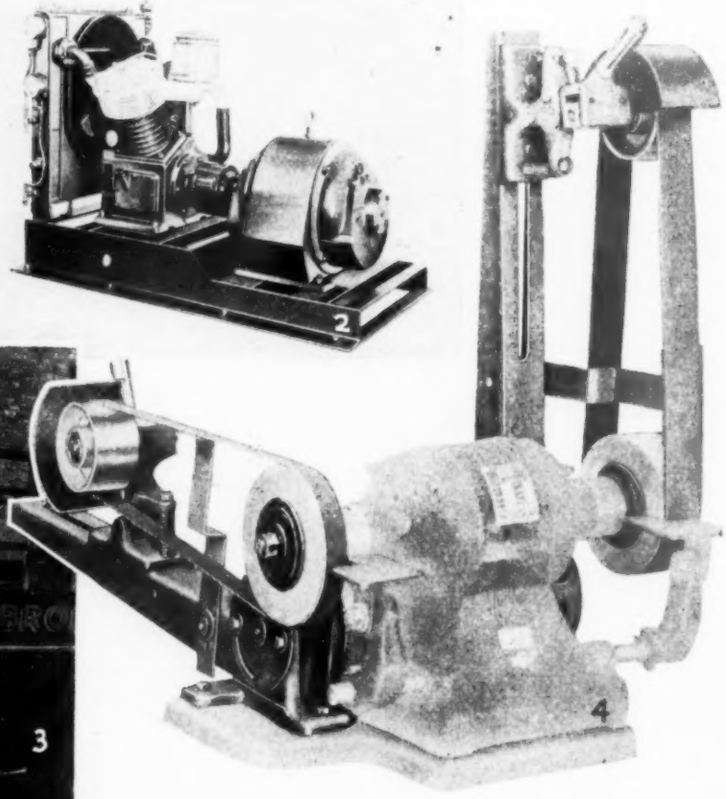
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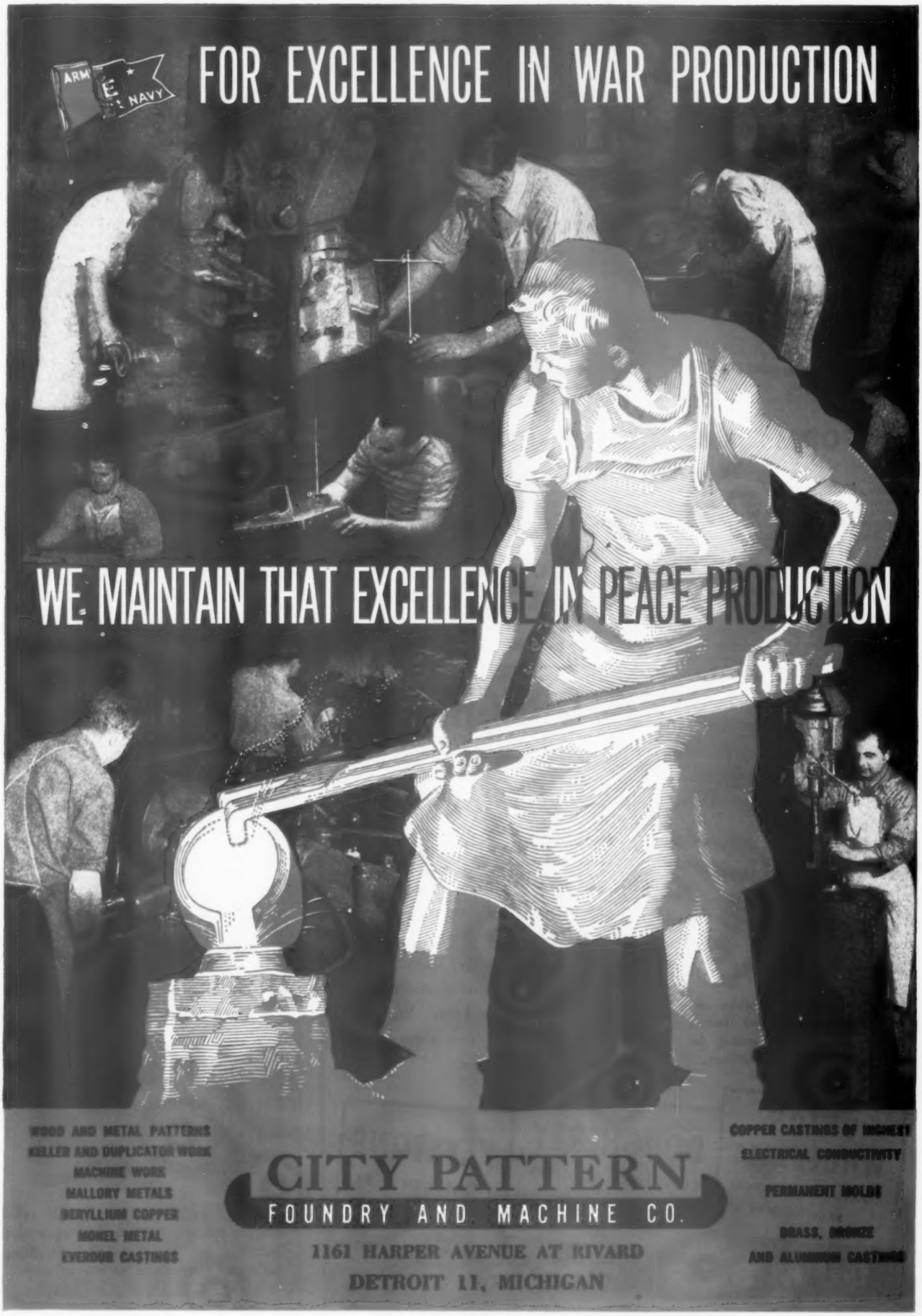
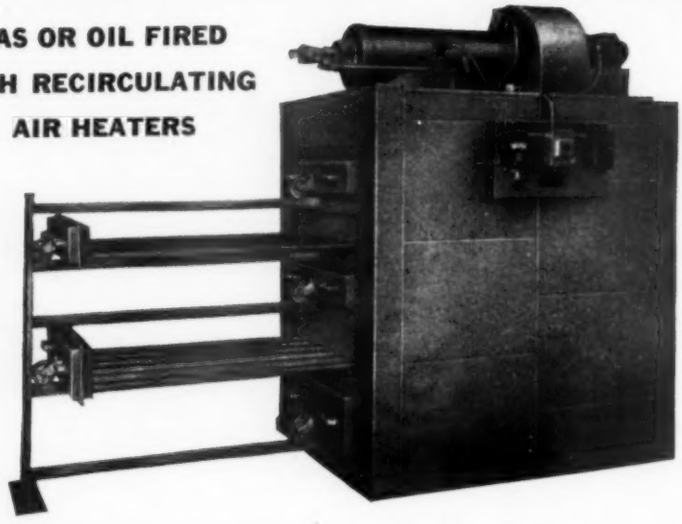

FOR EXCELLENCE IN WAR PRODUCTION
WE MAINTAIN THAT EXCELLENCE IN PEACE PRODUCTION
WOOD AND METAL PATTERNS
KELLER AND DUPLICATOR WORK
MACHINE WORK
MALLORY METALS
BERYLLIUM COPPER
MONEL METAL
EVERDUR CASTINGS
CITY PATTERN
FOUNDRY AND MACHINE CO.
1161 HARPER AVENUE AT RIVARD
DETROIT 11, MICHIGAN
COPPER CASTINGS OF HIGHEST
ELECTRICAL CONDUCTIVITY
PERMANENT MOLDS
BRASS, BRONZE
AND ALUMINUM CASTINGS

PORBECK DRAWER TYPE OVENS

GAS OR OIL FIRED
WITH RECIRCULATING
AIR HEATERS



UNIFORM CORES CONTINUOUSLY WITH LOW COST OPERATION

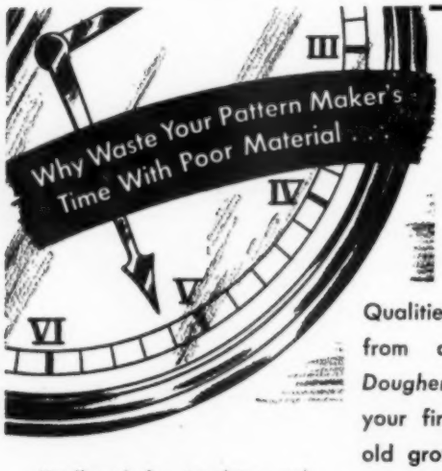
Strictly a *production* unit—note that all drawers operate independently of each other. Comes completely equipped with latest type temperature indicating controls (variable 100° to 650° F) and high efficiency recirculating air heater. Sturdy construction with 4-1/2" fibre-glass insulation throughout. Users commend Porbeck ovens for their space and time saving features. Available in several types and sizes. We invite your inquiry.

WRITE FOR NEW CORE OVEN BULLETIN "F"

PORBECK MANUFACTURING CO.

Manufacturers since 1894 of Core Ovens, Mold Dryers, Processing Ovens, Mold Drying Ovens, Heat Treating Ovens, and Paint Baking Ovens.

2600 N. Ninth St. **St. Louis 6, Missouri**



DOUGHERTY
Perfection
PATTERN LUMBER
is now AVAILABLE!

Qualities of easy workability, freedom from cracking and warping make *Dougherty Perfection Pattern Lumber* your first choice, always. Sawn from old growth logs, processed under rigid inspection in our own kilns. Write or call the Dougherty plant nearest you for complete information.

Hardboard for templates and lagging, dowels and bottom boards—skids and crating for large castings or machinery.

UNION WHOLESALE
YOUNGSTOWN 8, OHIO
Phone: 4-5189

DOUGHERTY
CLEVELAND 5, OHIO
WILLOW RANCH, CALIF.
Phone: Diamond 1200

KEYSTONE
PITTSBURGH 3, PA.
Phone: HEmlock 0700

LUMBER COMPANY

(*Continued from page 228*)

Also for master patterns. Alloy melts at 430 F, has a hardness of 22 brinell, compression of 8000 psi, tensile strength of 11,500 psi, shrinkage approximately .001 in. per in.

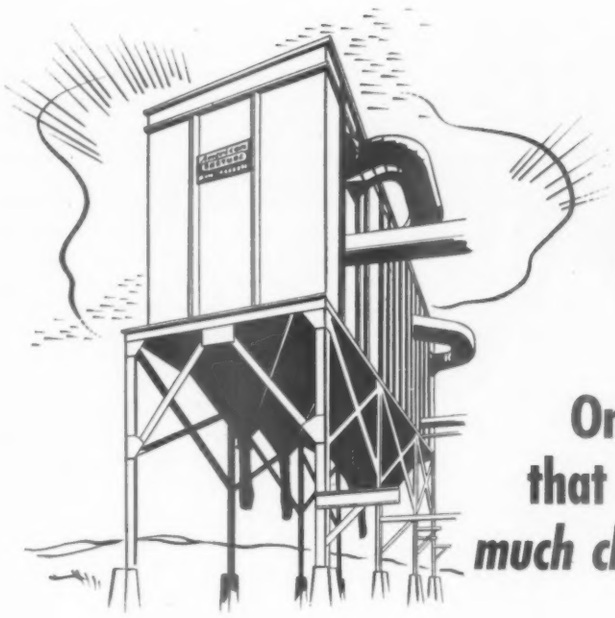
Lift Truck: Barrett-Cravens Co., 3255 West 30th St., Chicago 23, offers a new truck with electric drive and lift handling loads to 6000 lb. Controls operated at any position of the steering

handle give two speeds forward and reverse, and raise and lower hydraulically the load-carrying platform. Truck moves at walking speed empty or fully loaded and does not snag on inclines, door sills, etc. It is available in 6, 7, 9 and 11 in. height—all with a full 4 in. lift.

Gas Burner: North American Mfg. Co., 2910 East 75th St., Cleveland 4, has developed a new type nozzle mixing gas burner. A feature of the burner is that when the gravity and unit thermal content of the gas to be used is known the factory may preset the air-gas ratio to allow positive initial light-up on one or more companion burners in actual field service. An indicator vane with marked dial may be easily adjusted if there is

a change in the gas used or if other air-gas ratios are desired. Proper dial locations are listed on the simplified table and instructions on the adjustment

(*Continued on page 232*)



Designed for SIMPLICITY

One of 10 important features that make this bag type collector *much cheaper to operate and maintain*

The Dustube has been engineered for complete simplicity to provide outstanding savings in installation, operation and maintenance costs. For a complete discussion of the highlight-features listed here, write for Catalog 72

Easy to Install Tubes

Tube hangs on hook attached to shaker channel. Spring band at bottom seals into cell plate over dust hopper. Only one man required. No tools needed.

Longer Cloth Life

Tubes are never under tension. No metal contacts to rust, corrode or abrade cloth. Only fine float dust ever reaches the tubes; never the coarse, heavy particles.

Clogging Prevented

The opening through each tube is from 5" to 8" depending upon size of unit selected. This, plus the fact that tube is limp when shaken, prevents dust caking.

Tubes Economical to Ship and Store

Tubes are compact, light, and occupy little space. Their lightness materially decreases weight of collector, an advantage when installing on a roof.

Shaking is Fast and Thorough

Tubes are shaken while limp and deflated. Shaker is on clean air side. Dust falls immediately into dust hopper, never on other cells.

Rapid Tube Inspection

Tubes and shaker mechanism are easily accessible. The condition of every tube can be perfectly determined without removing any part whatsoever.

Power Savings

Ample tube spacing and ample expansion areas insure lower air velocities and better distribution of dust and air throughout the entire collector.

Highly Efficient Operation

Efficiency *by weight*: 98% and more; *by dust count*: discharged air shows less than 10 million particles per cubic foot from 2 to 10 microns in size.

Uniform Air Velocities

Ample spacing of tubes reduces resistance to air flow. Shaking periods are shorter and less frequent due to thorough cloth cleaning.

Low Cost Operation

Few working parts to wear. Inexpensive tubes. Power savings. Simplest type of cloth collector and least expensive to operate and maintain.

American FOUNDRY EQUIPMENT CO.
505 SOUTH BYRKIT ST. MISHAWAKA, IND.

dustube DUST COLLECTORS

Modern Design...
MEANS FUTURE ECONOMY!

The modernity of design and layout of your plant or expansion project will definitely be a determining factor in the success of your enterprise. We have devoted nearly a quarter-century to solving the many and varied problems associated with design, construction and operation of modern foundries. Our highly trained staff of engineers is always at your service and ready to assist you with any design or construction problems you may encounter. Write or telephone us today!

FOUNDRY ENGINEERS SINCE 1919

A. A. WICKLAND & CO.

ENGINEERING BUILDING • CHICAGO (6)

TELEPHONE ANDOVER 5922

CARBOTTOM FURNACE particularly adapted to handling large castings. As designed by Bellevue engineers highly efficient and economical and subject to very accurate temperature control with automatic proportioning burner equipment. In comparatively small model shown, miscellaneous castings and forgings are heat treated. . . . Car type furnace can be had in various designs . . . over firing . . . under firing . . . recirculating type method.

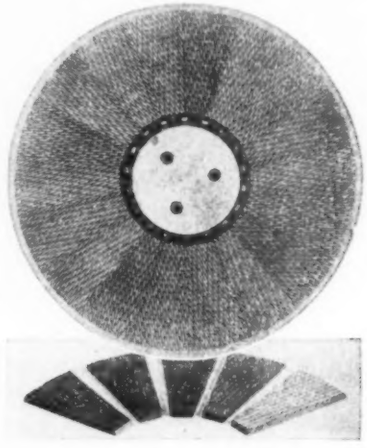
Bellevue **INDUSTRIAL FURNACE COMPANY**

2971 BELLEV E DETROIT 7, MICH.

(*Continued from page* 230)

cover plate. Simplicity of control and the provision for exceptionally deep turndown with no flash-backs are other features. Gas at low pressure may be used and capacity variation may be controlled manually or automatically. Burner is adapted to forging, heating and metallurgical furnaces, direct or indirect fired ovens and other installations where a sealed-in, premix type flame is desired. It is marketed as a complete unit of mixer, burner, mounting plate and tile.

Disk File: Kennametal Inc., Latrobe, Pa., is producing a disk file for use on light alloys and plastics, being designed to facilitate the facing of rough castings. It consists of double-cut segments of solid Kennametal, securely



dovetail-wedged into a 12 in. diameter steel body which can be supported and driven by any suitable means. Teeth are formed and positioned so that the material is sheared off in clean-cut chips. The file body may be attached directly to a rotating member of the driving machine or a flanged adaptor may be made.

Cable Splicer: Tweco Products Co., Wichita 7, Kans., announces a new line of welding cable splicers which provide quick repair of broken cables or salvaging short lengths. A simple clamp cable connection on each end of splicer, with provision to solder between cable ends, assures an efficient connection. Fibre sleeve covers the splicers, which are available in three sizes to cover full range of welding cables.

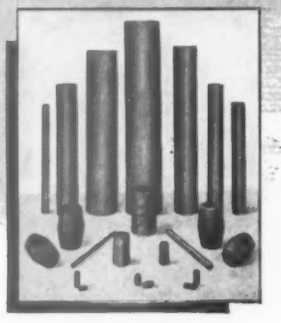
Metal Cleaners: Pennsylvania Salt Mfg. Co., Philadelphia, has announced two new metal cleaners. A-22 is a general purpose soak tank cleaner for use on all aluminum alloys. Most common applications are cleaning aluminum before anodizing, chromodizing, phos-

(*Continued on page* 234)

names worth remembering . . .

★★★★★ **Hadfield** for the invention of manganese steel in 1883.

★★★★★ **INTERNATIONAL** for *electrodes* with a low rate of oxidation.

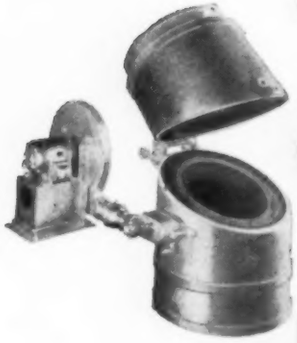


HIGH on the list of "musts" for graphite electrode performance is the ability to withstand oxidation at high temperatures. Because INTERNATIONAL Electrodes are made and completely graphitized by scientifically controlled methods, they have shown, in repeated tests, superior resistance to oxidation and burning at high fixed temperatures. Under normal conditions, temperatures considerably higher than 500 degrees C. can be attained with INTERNATIONAL Electrodes before burning takes place.

Low rate of oxidation plus the other advantages listed below account for the high performance standards set by INTERNATIONAL Electrodes wherever they are used. Remember, too, that their superior quality is a big factor in operating economy. Write for details today.

OTHER ADVANTAGES

- ★ Slow consumption
- ★ High current capacity
- ★ High thermal conductivity
- ★ High degree of purity
- ★ Consistently uniform properties and dimensions
- ★ Low cost per ton of production



3 BIG ADVANTAGES
IN THE EXCLUSIVE
SPLIT BODY DESIGN
ILER
CRUCIBLE DRAW FURNACE

1. **Quick, easy handling of crucibles . . . saves labor, more melts per day.**
2. **Faster operation . . . heat trapped in upper section saves reheat time.**
3. **Cuts fuel costs 20% or more . . . preheating air plus trapped heat saves fuel.**

These are but 3 of the big Iler advantages for your non-ferrous production or your metal pattern department. Check the others.

Available in sizes 50-70-90-125 to accommodate crucibles of corresponding number. Burner for gas or oil optional. Prompt Deliveries.

WRITE FOR FULL DETAILS AND PRICES NOW!

The FEN MACHINE Co.
1350 BABBITT ROAD
CLEVELAND 17, OHIO

ILER
CRUCIBLE
DRAW FURNACES

SPECIAL

There is a grade and size of Semet-Solvay Foundry Coke best suited for every cupola melting job. Our metallurgists are ready, willing and what's most important, capable. They will be glad to give you the benefits of their years of practical experience.

SEMET-SOLVAY COMPANY

BUHL BUILDING, Detroit 26, Mich. — GENESEE BUILDING, Buffalo 2, N. Y.
DIXIE TERMINAL BUILDING, Cincinnati 2, Ohio
Canadian Sales Agent: Standard Fuel Co., Ltd., Toronto

Semet-Solvay Foundry Coke

for Better Melting

(*Continued from page 232*)

phatizing and other prepainting treatment and before deoxidizing and subsequent spot welding. PM-95 is a specially prepared cleaning and descaling compound containing additional agents for surface action and inhibition. Suggested uses are general pickling and metal descaling, especially for difficult-to-remove oxides resulting from heat treating or annealing.

Core Grinder: D. J. Murray Mfg. Co., Wausau, Wis., announces a portable machine for grinding sand core faces before pasting cores together and thus producing a uniform accuracy not possible with hand filing, as well as saving time and labor. Built to machine

tool precision, it will handle a large range of core sizes and is furnished complete with a 1-hp motor. Small cores can be mounted in multiples in gang fixtures for production runs. Requiring floor space of only 3 x 5 ft, it is mounted on large casters for easy portability. Maximum clearance between face of the table and face of grinding wheel is 18 in.

Speed Control: Yardeny Laboratories Inc., 105 Chambers St., New York 7, has perfected a dial which when applied to commercial speed changers provides fingertip remote control of speed. Dial can be set instantaneously to any desired speed and speed changer will follow as fast as the regulating motor can drive the speed-adjusting screw. Exact speed setting is possible and the dial gives precise indication of speed to operator. Dial can be calibrated in rpm, fpm, gph, etc. No other speed indicating devices are required. Any speed within range of changer can be selected with an accuracy of better than 2 per cent. In operation the dial controls rotation of small motor used to adjust pulleys or gears of speed changer. Rota-

(*Continued on page 236*)

...with I-R Chipping Hammers

The three factors that you must watch on your chipping jobs are the amount of metal removed, the time required to remove it, and the cost of removing the metal.

First: The amount of metal removed depends upon the selection of the right chipping hammer for the job. For your selection our complete line includes four different types and many sizes.

Second: The time required to remove the metal is important. Chipping hammers lead a rugged life, and their cutting efficiency may take a terrific drop if certain factors are not watched and checked periodically. Our engineers are specially trained in the proper operating and maintenance techniques required to give you the highest degree of chipping hammer "cutting efficiency."

Third: The cost of removing the metal involves factors one and two as well as several others, such as—correct air pressure at the tool—efficient layout — correct chisel shapes — standard tests for "cutting efficiency," etc.

They all sum up to the fact that I-R hammers and I-R "cutting efficiency service" can produce the results you need to turn out more and better jobs. Call our nearest office. Our engineers are ready to help you. Also yours for the asking is a two-color wall chart on chipping hammer repairs, Form 5634. Send for a copy now.

SEVENTY-FIFTH I-R ANNIVERSARY

CHIPPERS • DRILLS • GRINDERS
RIVETERS • WRENCHES • HOISTS

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CLEVELAND ELECTRO METALS CO

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"Lectro Pat" Aluminum Pattern Alloy
No. 12 Extra Grade Aluminum Alloy
No. 12 Regular Grade Aluminum Alloy
General Casting Aluminum Alloy
95-5 Si Alloy
No. 108 Aluminum Alloy
No. 195 and 195B Aluminum Alloy
No. 355 Aluminum Alloy
Deoxidizing Aluminum, Grades I, II, III, and IV
Notch Bars
Shot (screened and bagged in 100 lbs.)
Ey-Bars
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Cast Sticks (¼" x ¾" x 48")

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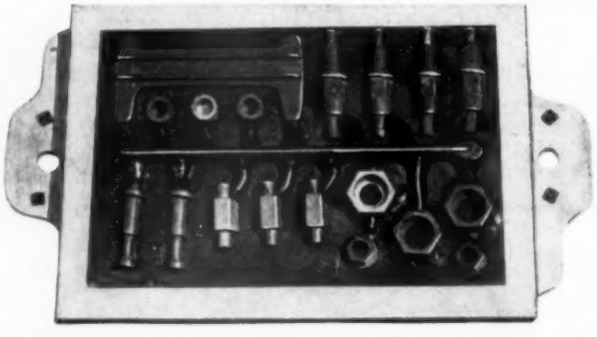
Loose and Metal Gated Patterns Converted into Profitable Jobs with

TAMASTONE

• By making the COMBINATION TAMASTONE PLATE shown here casting requirements were met in record time. The foundry was able to turn out a job considered impractical. By converting these pattern odds and ends into a Tamastone Match Plate the customer received his work on time and at a BIG SAVINGS over loose pattern production. Here is a case where the foundry was able to satisfy the customer on a "nuisance" job and do it PROFITABLY.

CHECK UP! ARE YOU PASSING UP PROFITABLE JOBS?



Tamastone can help you solve many difficult problems. Help you speed production as much as 400%. Cut costs up to 75%.

WriteToday!

TAMMS SILICA COMPANY, 228 N. La Salle St., Chicago 1, Ill.

(*Continued from page 234*)

tion of speed selector dial causes this motor to drive adjusting screw until output speed of controlled device corresponds to speed selected on dial. It can be built in or added to any equipment having motor operated adjustment.

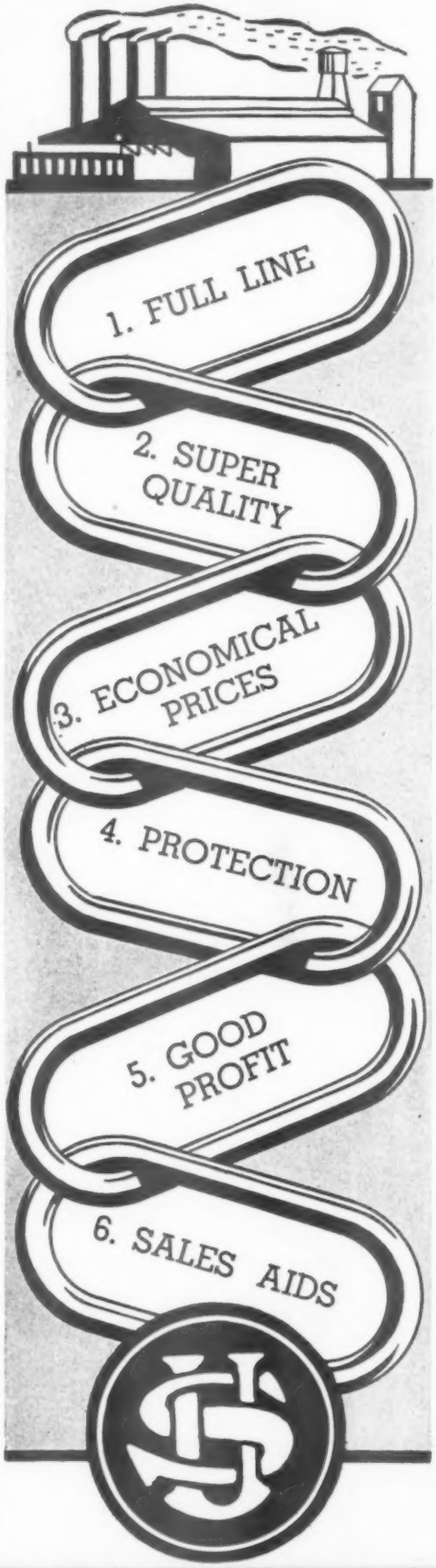
Portable Elevator: Domestic Industries Inc., Albion, Mich., is offering a low cost portable elevator called the Service Shop Lifter. It can be used for raising tote boxes, tiering boxes, loading and unloading motor trucks, lifting and transporting heavy fixtures, positioning heavy work and as a die table. Lifting platform is cranked up and down by a removable hand crank which raises

the platform 3-in. with each revolution. Cut steel gears, sealed ball bearings and heat treated steel guide wheels assure smooth operation. Elevator is easy to move about on its running gear of 4-in. roller bearing casters and is equipped with a foot-operated floor lock with rubber pad on the bottom for floor protection. Overall height is 6 ft; lift of platform, 4 ft 8 in. from floor; lowered platform height, 5½ in.; platform size, 24 x 24 in.; capacity, 500 lb; shipping weight, 260 lb.

Turntable: Whiting Corp., Harvey, Ill., is introducing a rugged, simple turntable which, due to the weight being carried on a ring of 1-in. diameter ball bearings, allows the load to be turned to any position with little effort. A quick-acting, foot-operated release lock, at table top level, holds table securely in position. The top overlaps bottom castings to prevent accumulation of dirt. Standard sizes range from 42 to 96 in. in diameter, with larger tables built on order.

Solder: A solder with three independently filled cores of pure rosin flux is a new development of Alpha Metals Inc., 369 Hudson Ave., Brooklyn, N. Y., which offers users fast soldering and elimination of dry joints, in addition to

(*Continued on page 238*)



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SUPER-SERVICE SURFACER MODEL SU9

Exceptionally powerful machine designed and built for heavy duty sanding, gouging, right angle grinding, planing or rubbing operations. Streamlined design with straight line ventilation which prevents clogging and assures cool motor operation. Air outlet diverts dust-laden air away from operator.

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FOR GRINDING
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CINCINNATI, OHIO

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Remember! You Can Put IT There with Powerful PROPELLAIR VERTI-STACKS

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Dampers Open Wide . . . Offer Virtually Zero Resistance to the High-Velocity Discharge of These Efficient Power Roof Ventilators

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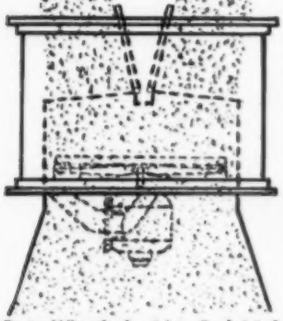


Puts What's Inside, Outside!

"MOVING AIR IS OUR BUSINESS"

PROPELLAIR INC SPRINGFIELD · OHIO

(*Continued from page 236*)

substantial savings in tin. Arrangement of the three cores places them close to the surface. Since the walls are thin, the solder melts quickly, and heat penetrates to the flux rapidly, allowing it to flow freely and reach work ahead of molten solder. It exceeds ASTM Class A specifications and is available in all alloys, all flux percentages and all gauges.

Car Puller: Silent Hoist Winch Crane Co., 841 63rd St., Brooklyn, is making a new model electric capstan car puller in which the worm-gear is integral with the motor and runs in a continual

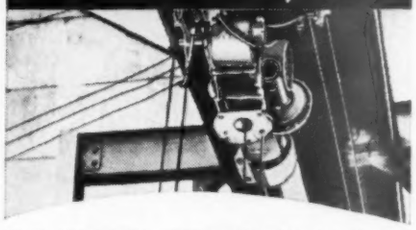
bath of oil. Available in two sizes, 7½ hp with 5000-lb draw-bar pulling capacity and 15 hp with 10,000-lb pulling capacity, it is fully enclosed making it ideal for outdoor use. It may be used with 220/440 volts, 3 phase, 60 cycles, and also is available for dc service.

Metal Applicator: Kerkling & Co., 1765 North San Fernando Rd., Burbank, Calif., are introducing a metal applicator for repairing cracked engine blocks and other metal castings. With this equipment fewer pins are used in lacing the crack, and after these pins are peened, applicator is used to fill remain-

der of the channel with the proper metal. In addition it may be used for filling blow holes in castings, brazing and soldering. Applicator comes in compact metal case with compartments for the cables and is portable. Nickel, bronze,

(*Continued on page 240*)

This Hoist LIFTS PRODUCTION LOWERS COSTS *Here's Why...*



Each READING ELECTRIC HOIST installed in your plant is "tailor made"—at no extra cost—to fit your own handling operation. As a result you get a hoist that quickly moves your materials safely and easily.

Then too, the simple design of a READING ELECTRIC HOIST gives you a sure way to cut maintenance costs. There are only four moving parts in the hoisting unit. Each part is "easy-to-get-at" for routine inspection and overhauling.

For more information on how you can step-up production and cut costs with READING ELECTRIC HOISTS, contact your nearest Reading Distributor. And if you haven't already sent for your free copy of "144 Answers To Your Hoisting Problems," drop us a line today.

READING CHAIN & BLOCK CORPORATION
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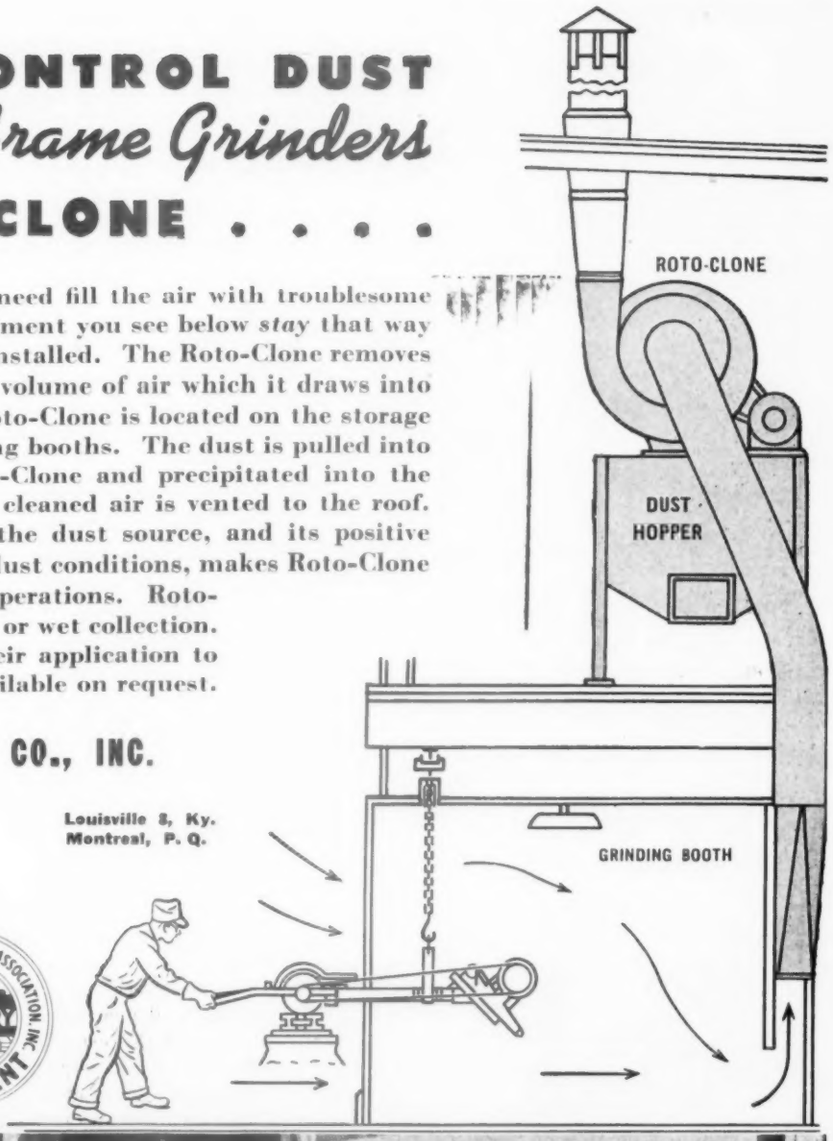
CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

HOW TO CONTROL DUST *from Swing Frame Grinders* WITH ROTO-CLONE . . . .



Swing frame grinders no longer need fill the air with troublesome dust. The clean floors and equipment you see below *stay* that way since a Type D Roto-Clone* was installed. The Roto-Clone removes *all* the dust because of the large volume of air which it draws into and through the booths. The Roto-Clone is located on the storage bay on the floor above the grinding booths. The dust is pulled into the booths and up by the Roto-Clone and precipitated into the storage hopper at its base. The cleaned air is vented to the roof. Ease of installation at or near the dust source, and its positive operation under the most severe dust conditions, makes Roto-Clone especially suited to all foundry operations. Roto-Clones are available for either dry or wet collection. Descriptive bulletins covering their application to all foundry dust problems are available on request.

AMERICAN AIR FILTER CO., INC.
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MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

** Roto-Clone is a registered Trade-Mark for a Dynamic Precipitator or Hydrostatic Baffle-Type Wet Collector.*

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"RAPID" HAND SQUEEZER

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Will handle a lot of your bench jobs and save you money by trebling your production.

Handles flasks up to 16 x 30 inches. Comes complete with benches. Portable or Stationary Type.

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"RAPID" R9X JOLT

30% increased jolt capacity

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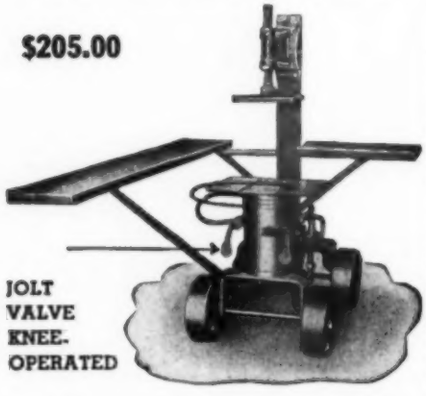

A Foundry producer of good molds for over 20 years.

Simple to operate.

Squeeze Plate quickly adjusted. Low initial cost.

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Write for NEW descriptive folders and Price Lists.

PIONEER

MANUFACTURING CO.

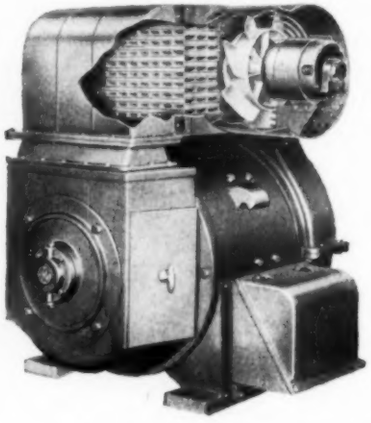
Molding Machine Manufacturer for Over 20 Years

MILWAUKEE (West Allis) WISC.

(*Continued from page* 238)

aluminum and the company's special alloy electrodes are available. Applicators come in two models, one for long, uninterrupted operation, the other suitable for ordinary block repair shops where continuous use does not exceed one hour.

Motors: General Electric Co. Schenectady, N. Y., announces a new line of unit-cooled, totally-enclosed, direct-current motors designed for operation in severe atmospheric conditions. Feature is the dual ventilating system, one unit of which circulates air from a fan on the armature through the motor and through one set of passages forming



a completely enclosed system. An auxiliary motor and fan moves external air through the other set of passages to absorb heat from the enclosed system. Thermostatic relay in the enclosed airstream system protects the main motor in case of failure of the auxiliary motor or accidental restriction of the air intake. The motors are furnished with either ball or sleeve type bearings and come in 15 to 200 hp at popular speeds and voltages.

Pickling Inhibitor: Oakite Products Inc., 57 Thames St., New York 6, offers a new material for inhibiting hot sulphuric acid pickling solutions. It may also be used in mixed sulphuric-hydrochloric baths in which sulphuric acid predominates. Material is said to improve and economize the pickling cycle by retarding the build-up of iron sulphate in solution.

Die Casting: Hydropress Inc., 570 Lexington Ave., New York 22, has developed a new series of six sizes of cold chamber die casting machines ranging from 10 to 190 tons injection pressure and having casting volumes, respectively, of 3 to 300 cu in. The machines are of horizontal design with vertically arranged injection chambers, full-hydraulic, self-contained, semiautomatic and electrically controlled. A double action injection valve for slow injection speed at the beginning, and a booster action which increases the speed in progress of the injection, insure slow metal filling velocities and high final pressure. The casting is ejected automotically when the die is opened. The machines are built for water hydraulic or oil hydraulic operation for working copper, aluminum, magnesium and zinc alloys.

Grinder: Grinding efficiency combined with flexibility and convenience have been combined in a new high-speed grinder manufactured by Wyzenbeek & Staff Inc., 838 West Hubbard St., Chicago 22. This compact grinder can be set on a bench, hung from a hook, or suspended from operator's belt. Three sizes are available, for light, medium and high speed work, for grinding, burring, filing, sanding or polishing, speed 10,000 rpm, in models ¼, 1/12, and 1/18-hp. Motors are ac-dc type with toggle switch in base and rubber cord and plug. Flexible shafts have patented casing, oil-proof synthetic rubber covered and innerlined with nonmetallic graphite impregnated innerliner. Handpieces are ball bearing type, with ⅛ and ¼ in. collets. Metal case including assorted accessories is available at small additional cost.

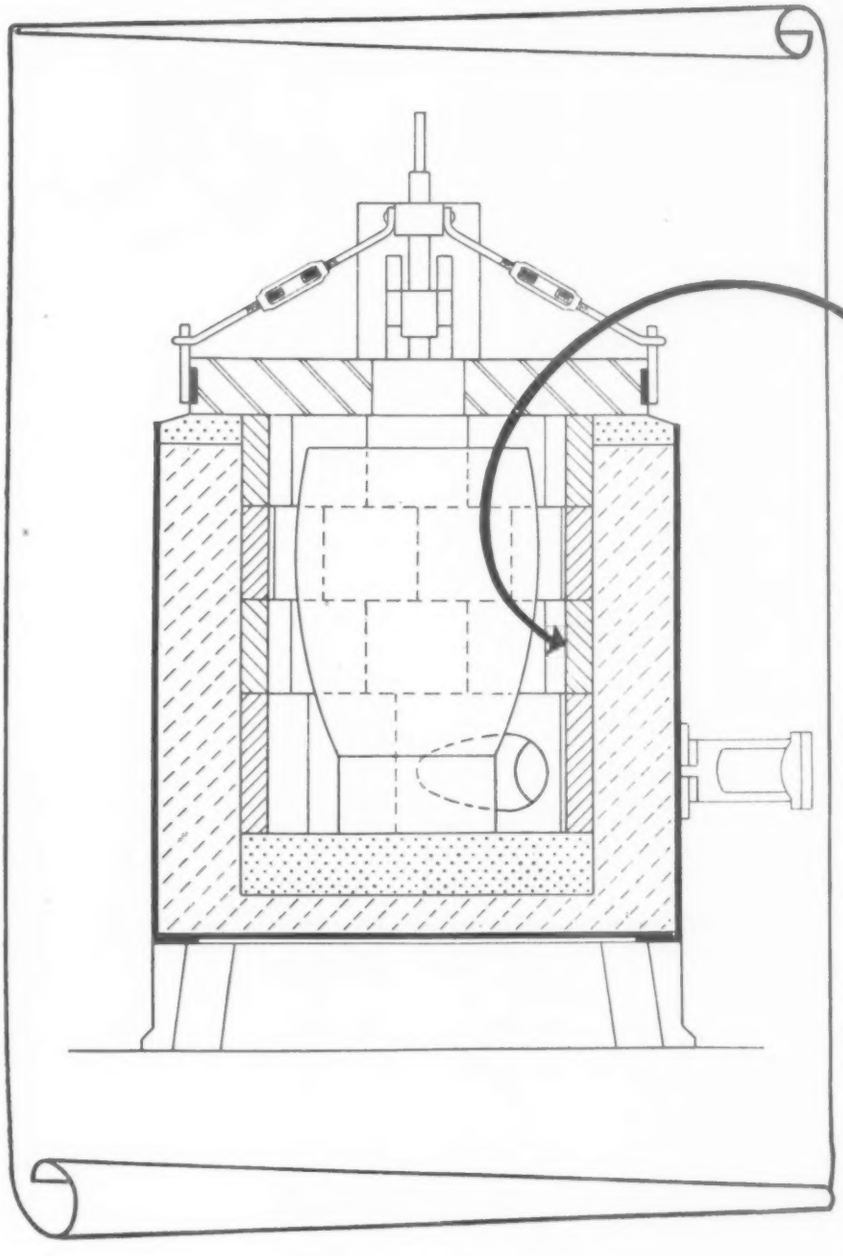
Gloves: Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland 3, features a specially designed thumb arrangement on the leather reinforced styles of asbestos gloves and mittens. Leather covers the thumb at points of

hardest wear and the arrangement helps prevent thumb seam from ripping open. These gloves and mittens with leather reinforced palm and thumb or palm, fingers and thumb are available in any length. All seams are double sewn.

Pyrometer: Wheelco Instruments Co., 847 West Harrison St., Chicago, has designed a new extension type portable pyrometer with plug-in extensions available in straight, 45 or 90 degree angle

(*Concluded on page* 242)

Melting MORE Metal for LESS MONEY



Faster melting rates, increased production, reduced fuel consumption are prime advantages provided by CARBOFRAX silicon carbide linings.

In hundreds of crucible type non-ferrous melting furnaces of both tilting and stationary designs, CARBOFRAX linings stand up exceptionally under rugged operating conditions. Only at infrequent intervals are repairs necessary. The small amount of maintenance required is quickly and easily completed at little expense. Per lb. of metal melted, lining costs are pleasingly low.

This is accounted for by an outstanding combination of characteristics including high refractoriness and resistance to spalling, cracking and flame erosion.

Because CARBOFRAX linings are a thin 1¼", more insulation can be used. An effective check against heat loss through the furnace wall is effected. Further fuel economies are realized.

In operation, the original diameter of CARBOFRAX linings is maintained. The melting rate remains constant. The life of the crucible is extended.

Interested in increased production from melting furnaces at lower cost, you will find a discussion with one of our engineers time well spent. He will gladly explain how simply and quickly an installation of accurate size CARBOFRAX tile can be made. Write Dept. L-96, The Carborundum Company, Refractories Division, Perth Amboy, N. J.

SUPER REFRACTORIES

BY CARBORUNDUM

TRADE MARK

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

Point for point American Long-Lyfe Nozzles are unmatched! Manufactured from the finest wear-resisting metal alloys they offer long, efficient, low-cost service.

For years leading industries have shown their confidence in these nozzles by consistently placing their repeat orders with us. They know that point for point American Long-Lyfe Nozzles offer more because of:

NEAR - DIAMOND - HARDNESS as in the case of the American-Norbide Nozzle which is made of boron-carbide, the hardest material ever developed for commercial use.

CHOICE OF INSERTS includes world-famed Norbide* and long-wearing Heanium Ceramic.

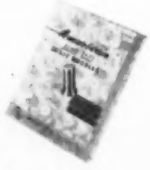
INLET ORIFICE is designed and protected against wear to preserve size and decrease air consumption.

ABRASION - RESISTING JACKET with extra heavy nose protects the insert from unnecessary abuse and wear.

FLANGE TYPE, SCREW TYPE, and SPECIAL designs for fitting American Nozzles to all types of blast equipment.

*Registered trade-mark for Norton Co.'s boron-carbide.

Write today for full data and prices on these three grades of Long-Lyfe Nozzles: American - Norbide, American - Heanium, and American V-Metal Nozzles. Ask for Catalog No. 27.



American
FOUNDRY EQUIPMENT CO.
505 S. BYRKIT ST., MISHAWAKA, IND.

NORBIDE • HEANIUM • V-METAL
NOZZLES

(*Concluded from page* 240)

types. Adapters permit the choice of material and calibration of thermocouples. Dual iron constantan scales are calibrated from 0-600 F or 0-1000 F and dual chromel-alumel scales are calibrated from 0-1600 F or 0-2500 F, all with centigrade equivalents. Readings are automatically corrected for variations in cold junction temperature.

Thermometer: Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8, is producing an all-metal, dial-type thermometer for indicating temperatures from 100 to 950 F. The bimetallic element has no pivots, mechanical linkages or gears, and is said to provide sustained accuracy within 1 per cent of scale range. Made of stainless steel, it is available with 3/16-in. OD stem and 5-in. free length, or with ⅜-in. OD stem and 9-in. free length. For portable use it has a handle which protects the operator's hand and which may be removed when the instrument is permanently mounted.

Atmosphere Generator: Lindberg Engineering Co., 2453 West Hubbard St., Chicago 12, has developed a fully automatic endothermic atmosphere generator—a central station unit that can furnish atmosphere for a number of furnaces. This new unit produces a clean, dry gas for hardening, brazing and sintering all medium and high carbon steels without carburization or decarburization. The generator requires no charcoal and does not have to be burned out periodically to remove soot. It operates by city gas, natural, propane or butane for both atmosphere and heating. It is built in four standard sizes: 500, 750, 1500, 2500 cu ft per hr, each unit requiring minimum floor area. Dimensions of the 1500 cfh generator are: width 4 ft, 2 in.; length 7 ft, 1 in.; height 7 ft, 8 in.

Time Indicator: Marion Electrical Instrument Co., Manchester, N. H., is producing an elapsed time indicator for operation on 115 volts, 60 cycles, indicating elapsed time from 0-9999.9 hr. Instrument is hermetically sealed glass-to-metal which excludes dust, dirt and moisture.

Hose Coupling: E. B. Wiggins Oil Tool Co. Inc., 3424 East Olympic Blvd., Los Angeles 23, offers a new hose coupling suitable for air, oxygen, oil, aromatic fuel and kerosene. It is guaranteed leakproof under working pressures up to 1000 lb. Coupling body has ¼-in. female pipe threads and is available with or without self-sealing valve. Choice of two nipples is provided—one with ¼-in. male, the other with ¼-in. female pipe threads. Entire unit is of solid aluminum bar stock.

Floor Liner: Industrial Products Co., 2827 North Fourth St., Philadelphia 33, offers a floor liner operating on the spreader principle using no brushes or sprays. It uses any kind of "zone" paint,

may be used on any firm surface and is easily cleaned by submerging in kerosene. Interchangeable spreaders are available in 2 to 6 in. widths.

Gagger Bar: Joseph T. Ryerson & Sons Inc., P. O. Box 8000-A, Chicago 80, offers a new gagger bar. Introduced about two years ago as an improvement in the reinforcing of concrete, especially designed reinforcing steel bars have been found to be suited also for foundry gagger bar applications. It is said that the special design consisting of double reverse helical ribs between horizontal ribs provides maximum mechanical grip as well as the greatest bonding surface for a given section of gagger bar. Sand may be packed firmly and evenly around each gagger, holding the mold together securely and thus prevent displacement of the mold material.

Core Binder: Metro - Nite Co., 3523 West Silverspring Dr., Milwaukee, is offering a mineral type binder adapted to cores for use in all metals. Various advantages claimed for the material include adequate hot strength and collapsibility, and economy through the short baking time required and reduction in cleaning costs and scrap castings. Known as Kor-Rite, the binder is not affected by humidity and can be stored for long periods without decreasing its effectiveness.

Controller: Foxboro Co., Foxboro, Mass., offers an improved instrument for control of temperature, pressure, flow and other variables in continuous processes or other processes in which control requirements are exacting. Instrument is readily changed from one type of control to another and is available for on-off control action, proportional, proportional and reset, proportional with derivative, and proportional and reset with derivative.

60-CYCLE CP GRINDERS

MAINTAIN SPEED UNDER LOAD

...with low maintenance

This 60-Cycle CP-460 Grinder is ideal where operations do not justify high frequency installations — or in plants that have such tools, but lack high frequency lines in locations where additional tools could be used advantageously.

The CP-460 Grinder has a powerful, lightweight, squirrel-cage induction motor, of the same type as the CP Hicycles, insuring high, sustained speed under load. It operates, however, on 60-cycle, 3-phase, 220-volt circuits.

The absence of commutators, brushes, brush holders and armatures, and the use of a sturdily constructed rotor with low slip characteristic, assure exceedingly low maintenance costs. Write today for detailed information.

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General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

NEW TRADE PUBLICATIONS . . .

GOGGLE CLEANING: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, has prepared a two-page bulletin describing a goggle cleaning cabinet with cleaning compound which prevents fogging of lenses. Cabinet dispenses the correct amount of cleaning compound to both goggle lenses simultaneously, contains wiping tissues and a receptacle for used tissues.

PLASTICS: Bakelite Corp., 300 Madison Ave., New York 17, offers a 36-page booklet providing a brief outline of origin, preparation, uses and application of modern plastics. Subjects discussed are thermosetting and thermoplastic materials; molding and extrusion; types of laminating; plywood molding and wood bonding; bonding materials and coating products; impregnating, sealing and calendering materials; cast resins; other fabricated forms such as sheeting, film, and fibers; and the various properties offered by the materials.

BELT CONVEYOR IDLERS: Chain Belt Co., 1600 West Bruce St., Milwaukee 4, has available a 26-page bulletin, No. 463, on a complete line of belt conveyor idlers. Photographs, tables, charts, diagrams and cutaway views are used profusely to illustrate the items. Proper selection of idlers is considered, as well as details of construction. Included in the book are photographs and illustrations of an impact-cushioning troughing unit and a rubber covered spiral return idler. A section is also devoted to special application idlers and belt conveyor accessories.

FOUNDRY MECHANIZATION: August's Ltd., Halifax, England, has published a 32-page brochure entitled "Foundry Mechanization by Specialists," which describes its modern equipment for improvement of foundry practice. Core sand driers, mixers, composite sand plants, mold driers, core and mold drying stoves, oil-fired muffle furnaces and quenching tanks are shown. Layouts and diagrams of mechanized plants installed by the company throughout England are described.

ELECTRODE CHART: Ampco Metal Inc., Milwaukee 4, is distributing a "Comparative Bronze Electrode Chart," which contains the AWS-ASTM classification of bronze electrodes and the grade numbers of arc welding rods produced by 15 manufacturers which meet various classifications. The chart gives an overall picture of electrodes available in the bronze field and permits users to select a type of rod that meets their requirements. Trade names and numbers are listed for proper identification.

REFRACTORIES: Chicago Retort & Fire Brick Co., 208 South La Salle St., Chicago 4, has available a loose-leaf illustrated catalog, No. 46, to help foundry operators and superintendents in solving their refractory problems. Products described and illustrated include cupola block manufacture, plastic patching of the cupola, slag and tap hole block, spout runner tile, bung and side wall brick, crane and reservior ladles, cylindrical ladles, pouring tile, mortar clay, and brick. Instructions on how to line a cylindrical ladle and how to install pouring tile in a ladle are given as well as standard sizes of cupola block, lining requirements for standard size cupolas and other valuable information on refractories.

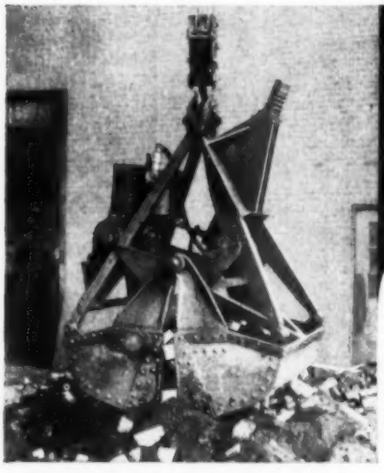
OVENS: Despatch Oven Co., Minneapolis 14, has prepared an 8-page bulletin, No. 31, which gives helpful information on a line of batch type ovens including car, rack, truck drawer and shelf models. Charts for capacities are given covering the various types, as well as installations of core and mold units, electrically operated, oil or gas-fired.

BELTING: Hewitt-Robins Inc., Buffalo, N. Y., offers a new belting catalog containing specifications and maintenance suggestions on a line of conveyor, transmission and elevator belting. The catalog is written in simple nontechnical terms and contains plant photographs showing the many uses of the belts. Instructions are shown by sectional drawings.

PNEUMATIC TOOLS: Catalog No. 12, recently published by Keller Tool Co., 4607 Lake St., Grand Haven, Mich., offers abundant information and illustrations of air tools and their practical on-the-job applications. Capacity and specification tables are presented with ordering instructions on the same page with each description. New tools developed during the war are shown, including an air-powered sawing and filing instrument, an impact wrench, and an air hoist in 300, 500 and 1000-lb capacities.

COATINGS: Dampney Co. of America, Department T61, Hyde Park, Boston 36, announces a comprehensive bulletin describing a new line of coatings that protect metal surfaces in power and process equipment against temperature damage from sub-zero to limit of organic materials. Above that point the pigment fuses into a protective surfacing effective up to 1600 F in the black and 1200 F in the aluminum finish. Thereafter, occasional dark red or bright red heat in operation, intermittent cold or continued standby at any temperature will not affect the coating. The bulletin lists the applications, furnishes data sheets, and tells the story of these coatings.

REFRACTORY CONCRETE: Atlas Lumnite Cement Co., 135 East 42nd St., New York 17, has published a new edition of its catalog which gives basic information on materials and methods used in making refractory concrete for different temperature and insulating requirements. Illustrations show a wide range of applications in the construction of heat treating furnaces, cooling pits, coke ovens and ceramic kilns. A section is devoted to heat-resistant concrete for



10 Little Minutes Does It . .

AND A LOT OF OTHER ADVANTAGES JUST AS GOOD!

Cut your material handling expense! See what the Browning Hydro-Electric Bucket will do for you. Users praise its low cost of operation and almost negligible upkeep. Bucket opens by gravity; no waste of power in closing. No sheaves, cables, chains or other similar headaches. No overloading of motor, no damage to bucket when bucket closes. Like all Browning equipment, the essence of simplicity in design and construction.

↑ Like hanging up your coat — easy, quick — no headroom needed — 10 minutes to hook or unhook — and away you go.

Write for our well illustrated Bulletin "F", and then let Browning engineers point the way to pronounced savings.

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WILLOUGHBY (CLEVELAND), OHIO
Designers and Builders of All Types and Capacities of Electric Overhead Traveling Cranes and Hoists and Electric Revolving Cranes

foundations, floor and structures subject to soaking heat.

RETAINING RINGS: Catalog No. 4, published by Waldes Kohinoor Inc., Long Island City 1, N. Y., contains 48 pages of technical data concerning varied applications of seven basic retaining ring types, said to save space, weight, machining and assembly costs. An easy-reference table gives correct ring size and number for every type of commonly used ball bearing. Special pliers fitting ring apertures to speed assembly are also shown.

FURNACES: Bulletin No. 422, issued by W. S. Rockwell Co., 210 Eliot St., Fairfield, Conn., is a 4-page circular describing car bottom furnaces for stress relieving welded steel structures and assemblies, annealing, drawing or heating large and irregularly shaped pressure vessels, forgings, iron, steel or nonferrous alloy castings and heating or carburizing large quantities of metal parts packed in pots or boxes. Furnace includes a car with refractory top forming hearth of heating chamber, top alone being exposed to heat. Lower metal part of car serves as the car proper for movement upon steel rails.

FLAME HARDENING: Air Reduction, 60 East 42nd St., New York 17, in Catalog No. 90, describes design and use of flame hardening apparatus from simple water-cooled torches and tips for hardening small parts to complete apparatus for use on large jobs. Equipment for gear hardening and hardening of internal and external rounds, as well as flat surface hardening, is included, and a variety of manifold, regulators, valves and seals.

SHAKEOUT: Bulletin No. 124-F, offered by Robins Conveyors Inc., Passaic, N. J., describes and illustrates a portable shakeout equipped with automatic flask loader which lifts flasks off foundry floor, deposits them on receiving table, turns them upside down on deck, shakes out sand and discharges castings, in one quick series of operations.

WELDING INFORMATION: Ampco Metal Inc., 1745 South 38th St., Milwaukee 4, issues a publication entitled "Ampco Welding News," available to welding engineers, practical welders and production men interested in latest methods of using aluminum bronze and phosphor bronze welding electrodes. The 8-page, letter-size quarterly magazine is illustrated with application scenes, diagrams, tables and fact stories relating to welding and electrodes.

PYROMETER CONTROLLER: Wheelco Instruments Co., 847 West Harrison St., Chicago 7, in a bulletin D4-2, describes the newest development of electronic temperature control. The new flexible multi-position electronic pyrometer controller uses two electronic control circuits which operate in harmony with each other, but independently. Control action is instantaneous. The 3-color bulletin lists applications and features of the instrument, describes operation and shows typical installation diagrams.

instantaneous direct readings of air velocity

The Alnor Velometer gives you instantaneous, direct measurement of air velocity in feet per minute. For low range readings just hold the Velometer in the air stream. For high range readings or inaccessible locations use the tube-connected special jets. Accurate readings are easily and quickly obtained without having to use charts or tables or make any calculations. The Velometer has many uses in the foundry, giving a valuable check on blower performance, exhaust systems, and other equipment.

The Alnor Velometer is built in several standard ranges, from 0-200 to 0-6000 fpm and up to 20 inches static or total pressure. Special range instruments available up to 24,000 fpm. Write for Velometer bulletin with complete description.

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420 NORTH LA SALLE STREET • CHICAGO 10, ILLINOIS

☆ little but - Oh My!

Carries its weight

in your Foundry where there's work to do. Save those castings with Shelton surface patching cement—sets like the Rock of Gibraltar.

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AMERICAN CRUCIBLE COMPANY
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For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

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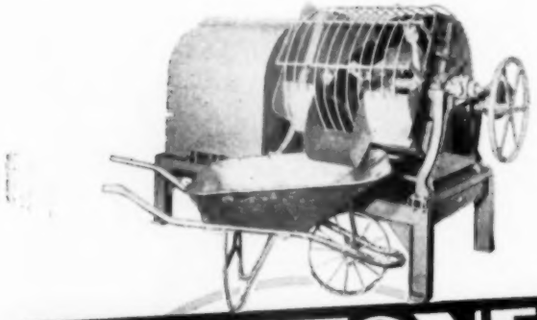
GENERAL OFFICES: 500 FIFTH AVENUE • NEW YORK 18, N. Y.



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THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

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When you have ample and handy dry storage capacity you can order conditioned sand by the carload lot. That's what hundreds of foundries learned during the war. That's why they invested in Neff & Fry super-concrete stave bins.

Built anywhere, any size and by trained traveling crews. Covered by guarantee.

• 1946 Foundry Bin Catalog Ready

THE NEFF & FRY CO.
Camden, Ohio

NEFF & FRY
SAND BINS

ARCADE *Jolt Squeezers*

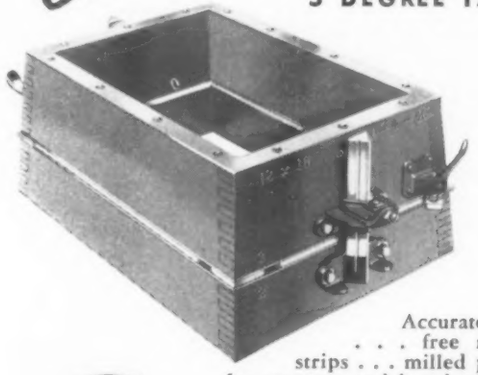
No. 91 *and* No. 101

Machines of this type may be used as a jolter, a plain squeezer, or both operations may be used on the same mold. The lifting capacities of the jolt cylinders are so much in excess of what one man can handle that they cannot be overloaded.

	No. 91	No. 101
Jolt Cylinder	4″	5″
Squeeze Cylinder	10″	13″
Between Uprights	36″	38″

ARCADE *Cherry Slip Flask*

with
5 DEGREE TAPER



Accurate dimensions . . . free moving sand strips . . . milled pins and ears for squeezer and bench work or round pins for machine molding . . . steel jackets to match.

Write for complete information.

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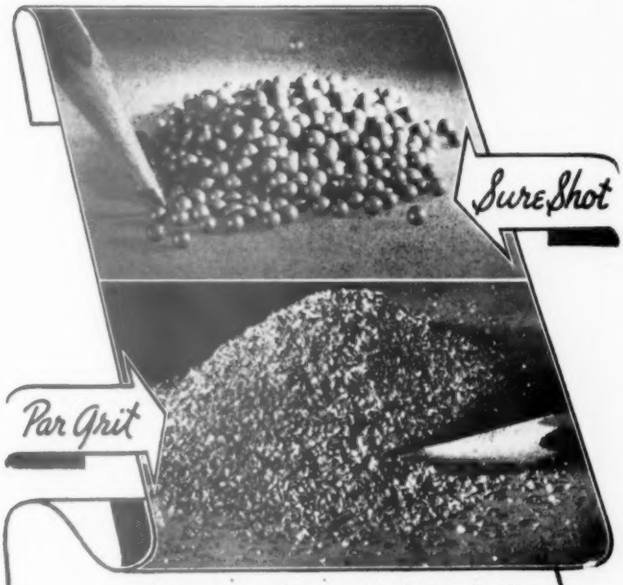
STEEL *Abrasives*

That Clean Better and Faster!



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Unusually Hard, Tough Steel Abrasives

"SURE SHOT" and "PAR GRIT" abrasives set a new standard in uniformity, sharpness and cleaning action. For greater speed on production work it will pay you to use these outstanding abrasives—they clean faster—last longer. Sizes available to cover every requirement.

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Steel
SHOT AND GRIT

For Toughest Blast Cleaning and Surface Peening Work and Cleaning Operations

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- Controlled screening and grading.
- Withstands repeated strain, stress and wear in blasting equipment.
- ITS TENSILE STRENGTH AND TOUGHNESS IS ESPECIALLY ADAPTABLE FOR PEENING.
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Hi-Grade Grit is thicker, sturdier, tougher. Exceptional abrasive qualities. Its construction gives longer usage. Definitely reduces operating costs.

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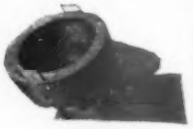
CENTRIFUGAL CASTING MACHINES

Model AS

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.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They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.

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Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.

Model J-P

CENTRIFUGAL CASTING MACHINE COMPANY
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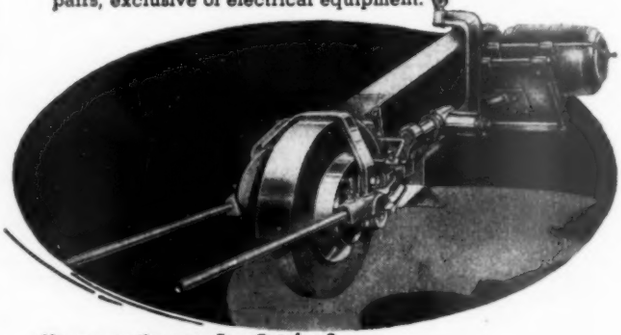
SWING FRAME GRINDER

- **BALANCE** Perfect center balance of wheel and motor ensures grinding ease and efficiency.
- **SAFETY** "Worker safety" is carefully provided.
- **ECONOMY** Greasing required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.



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● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.

JOLT SQUEEZER

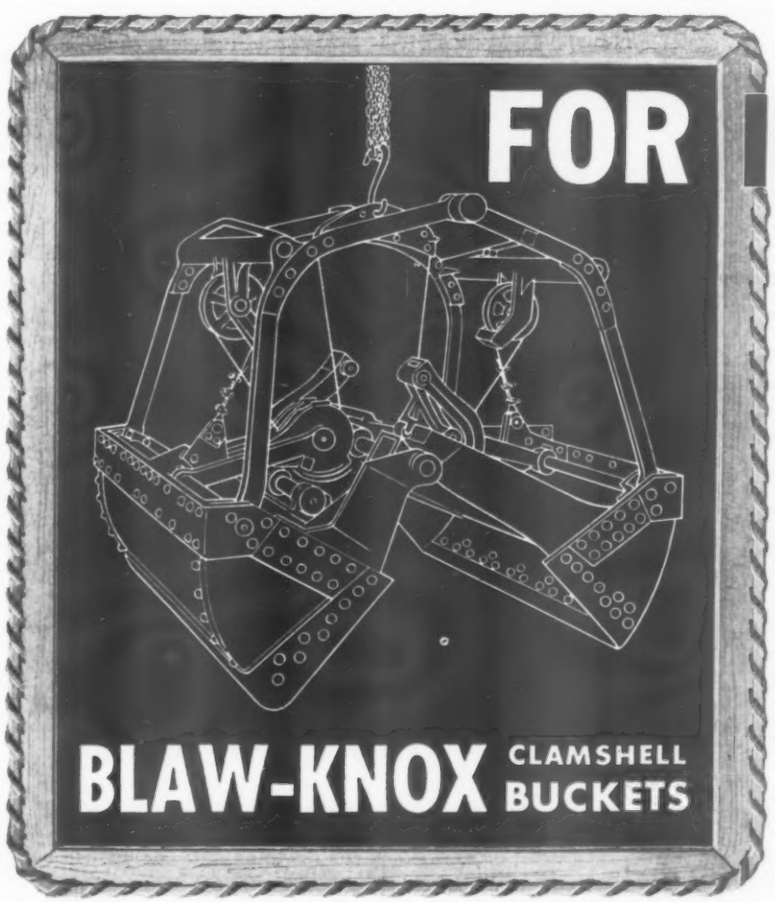
FULLY EQUIPPED

This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

HAYNES FOUNDRY EQUIPMENT CO.

814 Ada Street—Kalamazoo, Mich.

LADLES—BRASS FURNACES—CORE OVENS



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AMONG THE MANY TYPES OF BLAW-KNOX BUCKETS FOR FOUNDRY USE

You will find one designed for extremely low head room. The Single Line Hook-On type illustrated requires only 6 ft. 7 in. operating head room. Capacities range from ¾ to 4 cu. yds. . . . For detailed information on this and many other Foundry Buckets, just ask us for catalog 2002.

BLAW-KNOX DIVISION

of Blaw-Knox Company

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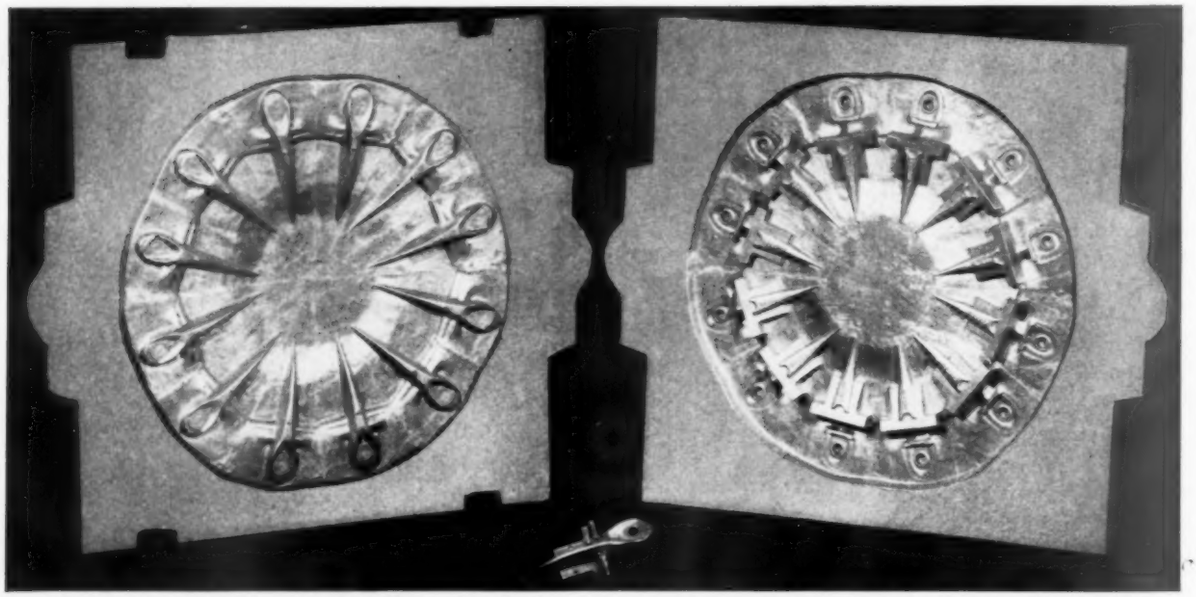
PRESSURE CAST MATCH PLATES and COPE & DRAG PLATES are the solution to lower production costs.



Single or Multiple Pattern Match Plates Made From One Pattern Cast Under Pressure In Plaster Molds

By PLASTER PROCESS CASTINGS CO.

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Profit by our many years of experience

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Manufacturing and recommending *specific products* for *specific results* has long been our company policy. The continuous and wide-spread acceptance of A.B.C. FLUXES and COATINGS over a long span of years is unqualified evidence of the efficiency, uniform dependability and economy of these products.

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Fast, dependable core sand Mixers. Triple mixing hoes assure thorough action. Flared drum for quick easy charging and discharge. Available with replaceable full hard abrasion resisting drum liner at slight extra cost.

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. . . AND
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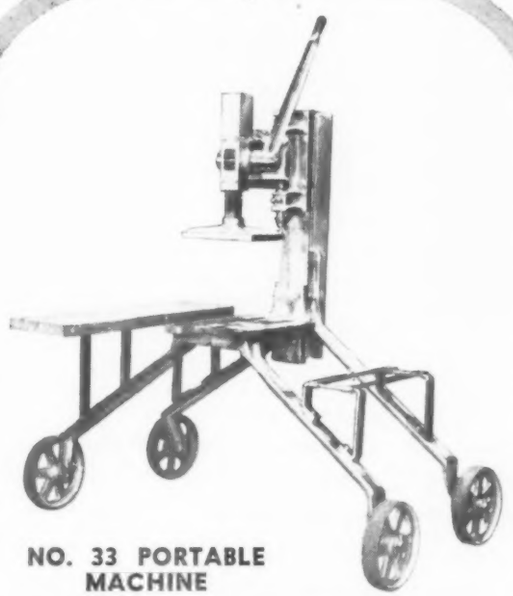
WATERLOO, IOWA

Put YOUR MOLDING PROBLEMS up to MOLINE!



NO. 33 PORTABLE MACHINE

THEY INCREASE PRODUCTION . . . KEEP COSTS DOWN!

An Illinois stove foundry writes, "We have been using your portable hand squeezers for a number of years and have had wonderful success with them. After installing them we were able to increase our production 25%." A Tennessee foundry says, "We are very much pleased with the operation of Moline machines and particularly the low upkeep cost." If your foundry does medium to small work on a production basis, we can show you how Moline Squeezers will save you money, too. There are four standard models which you may choose from. Illustrated here is the No. 33 Portable model which will handle flasks 12" x 24" or under.

MIW

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MOLINE IRON WORKS

MOLINE, ILLINOIS, U. S. A.

A Leading Team In Blast Cleaning Abrasives!

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SHOT GRIT

● Both 20th Century Blast Steel Shot and Grit are strong on results. Our Scientific Heat Treating Process make them so hard—so tough—that there is amazingly little wear and shattering. And they are outstanding in uniformity.

Made in all sizes. Write for Samples and Price List.

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"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

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The rental includes full coverage insurance; heavy lead storage containers and slide rule exposure calculators.

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NOTHING LIKE IT FOR SOUND CORE SUPPORT

CLEVELAND Patented COIL HEAD CHAPLET

SAND PACKS AROUND IT *Definitely* BETTER

The holding power due to unusual design and quality is gaining wide recognition in foundries producing automotive, stove and numerous similar castings.

We also make Square Head, Radiator Chaplets, Stem and Double Head Chaplets of proven dependability.

CLEVELAND Since 1890 *Chaplets*

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W. 67th St. & N. Y. C. Ry.
CLEVELAND, OHIO

"BRANFORD" FLASK RAPPERS

are cutting flask cleaning time enormously in many foundries. Labor expense is cut down to a minimum and flask damage entirely eliminated.

• Low initial cost,—economical of operation and maintenance.

• A large foundry in Pennsylvania reports on their 8" "Branford" Rapper—

"We are now shaking out a cylinder cope 10' x 8' x 4' in 18 minutes with two men that formerly took seven men 105 minutes to shakeout by hand."

Made in seven sizes for flasks 20" sq. up to 20' x 24' x 4' deep, green or dry sand.
Jaw construction will take wide variation of flask flanges without change.
Send for questionnaire, fill in specifications, we will quote.

1915 BRANFORD VIBRATORS U.S.A.

New Haven Vibrator Company

—Vibration Specialists—

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SAVE—

TIME
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USE—

Waterlox

FOR
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Economy

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Eliminate the rejection of leaky or "weeping" castings by impregnating them with Waterlox. The use of Waterlox seals all sizes of castings. It has been used successfully on 6-ounce tubes and on engine blocks weighing thousands of pounds.

Write For Details!

WATERLOX
DIVISION OF
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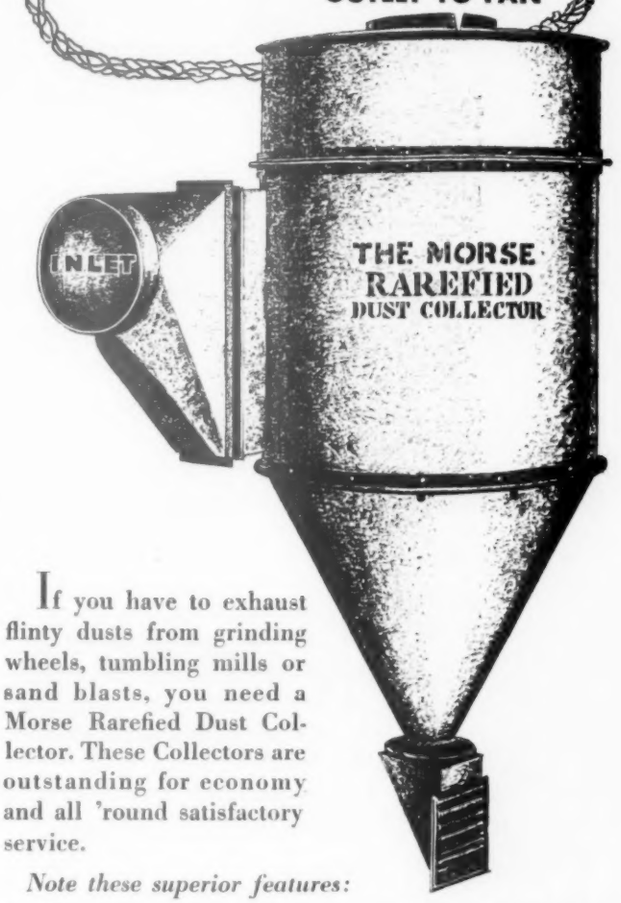
2636 East 76th St. Cleveland 4, Ohio

FOR EXHAUSTING FLINTY DUSTS

MORSE RAREFIED DUST COLLECTORS

DO A BETTER JOB



If you have to exhaust flinty dusts from grinding wheels, tumbling mills or sand blasts, you need a Morse Rarefied Dust Collector. These Collectors are outstanding for economy and all 'round satisfactory service.

Note these superior features:

1. No abrasive material gets through to the fan.
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3. No moving parts.
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5. Collected material is discharged automatically to storage bin.
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Write or phone for complete information on these superior collectors. A Goergen-Mackwirth engineer will gladly survey your problem and submit recommendations.

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SPECIALISTS IN THE MOVEMENT AND CONTROL OF AIR

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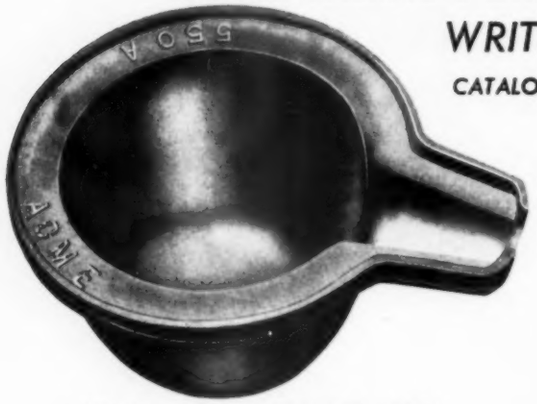
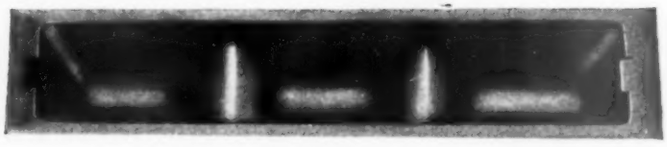
for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.



ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

WRITE for
CATALOG "F"

HOLDING BOWL NO. HP7001



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Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

ACME FOUNDRY COMPANY

DETROIT 16, MICHIGAN

2502 TWENTY-SECOND ST. PHONE LAFAYETTE 2404

HOW MUCH DO YOU PAY
PER CUBIC FOOT FOR

WET, DIRTY AIR?

Do you know the cost in dollars for the inefficiency, repairs and idleness of air actuated tools as a direct result of the use of wet, dirty air? • Remove moisture, oil and scale. Keep your compressed air clean and dry the Murphy way, the **GUARANTEED** way, and note the difference in air tool performance and cost of maintenance. • It matters not how large or small your compressed air system, we have an item in our extensive line of aftercoolers, separators and traps that will exactly meet your need. An item which is **guaranteed** to do the job for which it is recommended. An item that will cost you less than you are now paying for wet and dirty air. • Write us of your problem. State approximate size of your compressed air system and briefly outline the condition to be overcome. Our reply will be prompt and helpful, and you will be in no way obligated. Address Department A-13.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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Moisture Elimination Up To 3000 Pounds Per Square Inch

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for Handling and Pouring

ALL METALS

TIMKEN-WORM GEARED LADLES

These patented ladles are designed by men with over 30 years of practical foundry experience.

They offer the utmost in Safety, Dependability, Long Life, Ease of Operation, Convenience, Economy and Simplicity.

They are manufactured in all types and sizes, and are arranged for manual or electrical operation.

Our line of pouring and handling equipment is complete, including bowls, shanks, bails and tongs . . . special equipment.

INDUSTRIAL EQUIPMENT CO.

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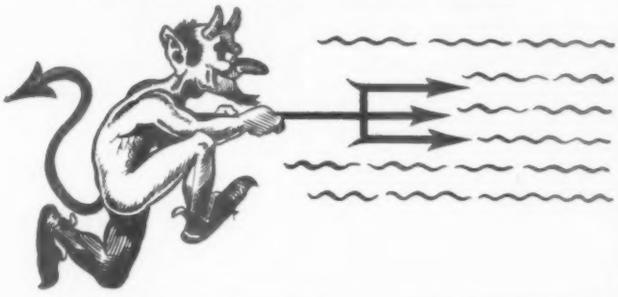
SOFFEL'S
THERMOTOMIC
METALS FEEDING COMPOUND
(PATENTS PENDING)

for Ferrous and Non-Ferrous Metals



KEEPS METAL MOLTEN

THERMOTOMIC is a new exothermic feeding compound which generates 35,000 B.T.U. per pound. Its use assures reduced size of feeding heads or risers, substantially lowered cleaning costs of castings, as well as a reduction in scrap losses. THERMOTOMIC is produced in powder form only. It can be molded into feeding ring cores or inserts of any desired shape by the same method as sand cores. No special equipment is required for its use. THERMOTOMIC raises the temperature of the metal where it is applied as feeding rings or inserts under the feeding heads permitting better feeding of the metal into the mold and retarding solidification in those portions of the castings where rapid cooling may cause piping, shrinkage or segregation. THERMOTOMIC can also be used as a facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC is past the experimental stage in its many applications with scores of nationally known foundries using it regularly as standard practice in the production of ferrous and non-ferrous castings.

SOFFEL'S CARBON-FREE LIQUIDIZER

for Ferrous and Non-Ferrous Metals

Keeps metal molten 50% longer in heads and risers. This is accomplished by retarding solidification by Exothermic Reaction. SOFFEL'S CARBON-FREE LIQUIDIZER kicks sluggish metal back to fluidity and life, keeps it that way by its insulating properties, and keeps heads and risers open and fluid. As a deoxidizer, when added in the pouring ladle, it removes occluded gases, increases the tensile strength and transverse, and REMAINS A POWDER, which is easily skimmed off. Free samples furnished in continental United States and Canada.

BEWARE OF IMITATIONS! WE ARE THE ORIGINATORS OF CARBON-FREE LIQUIDIZERS!

Also a complete line of SOFFEL'S fluxes and purifiers for all metals and alloys.

Write us for descriptive literature and full particulars

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Pittsburgh Metals Purifying Corp.

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Answers Another Chain Question . . .

"Elwel" Chains are the smaller sizes of American Chain's high quality electrically welded steel chain. There are three basic patterns as follows:

1. Elwel Coil Chain—either straight or twist link—made in 12 sizes from 5 (7/64") to 7-0 (5/16").

2. Elwel Machine Chain—straight or twist link—12 sizes, from 5 (7/64") to 7-0 (5/16")—from 25 to 11 links per foot. Elwel Truck Chain is similar to Elwel Machine twist link but is made in heavier sizes—up to 12-0 (15/32").

3. Elwel Passing Link—with links designed wide enough for links to pass—removing tendency to kink. Sizes 2-0 (No. 6 Ga.) to 7-0 (5/16").

Elwel Assemblies. Equipped with rings, hooks, toggles, snaps, etc., Elwel Pattern Chains are made into a variety of assemblies for farm and industrial use.

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the COMPLETE Chain Line

American Chain Division makes all types of electric welded and fire welded chain – all types of weldless chain made of formed wire or stampings – a complete line of chain fittings, attachments and assemblies – repair links – cotter pins – hooks.

ACCO York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland, Bridgeport, Conn.

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

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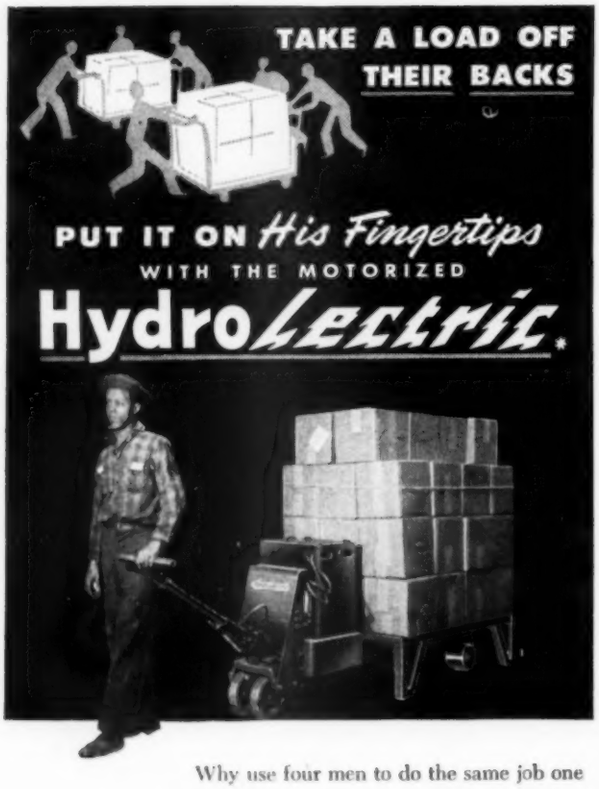

Why use four men to do the same job one can handle just as easily? Prominent fleet users report their Hydro*Lectrics* save up to 75% on handling costs—pay for themselves several times in one year. And this amazing truck is always on the job, too! Plants using Hydro*Lectrics* state this rugged truck handles more than its rated 4000 lb. capacity—up to 24 hours daily—WITH LITTLE OR NO DOWNTIME!

Anybody — man, woman, even a child can operate the Hydro*Lectric* with its magic finger-tip control. Permits handling of 2-ton loads or more with effortless ease. Find out how much the Hydro*lectric* can save in your plant. Write for folder "F".

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- Costs only 1/3 and weighs only 1/3 of other powered TRUCKS of equal capacity.
- Records up to 21 years of 8 hour day performance.
- Engineered by the Stuebings, Pioneers in Lift Trucks Construction Since 1910. Patented.

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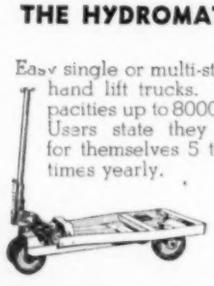
THE HYDROMATIC

Easy single or multi-stroke hand lift trucks. Capacities up to 8000 lbs. Users state they pay for themselves 5 to 10 times yearly.



Engineered and patented by W. Stuebing.

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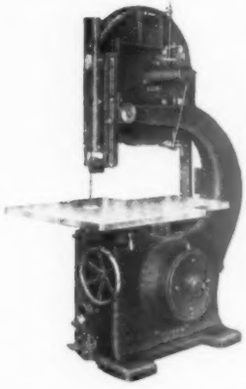
Walter Stuebing, *President*
2425 Spring Grove Ave. Cincinnati 14, Ohio

"OLIVER"
38-inch
BAND SAW

Saws Sprue, Heavy or Light Sections of Metals, Sheet Metals, Compositions or Wood

Here's a heavy-duty adaptable Band Saw. Available with very slow speed for cutting almost any metal including sprue. This Saw has 38-inch wheels. Can be placed on the floor—no pit required. Has the latest safety devices.



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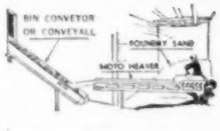
Rip Saws	Shapers	Speed Lathes
Jig Saws	Milling Machines	Metal Spinning Lathes

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN



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OF CASTINGS AND INGOTS

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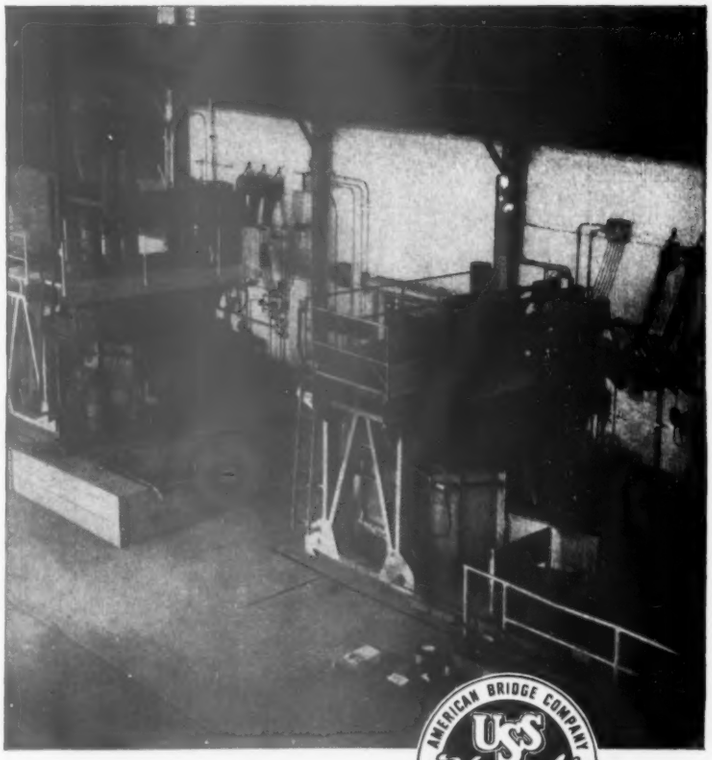

Top charging
Effective gantry design combined with platform attached to furnace for minimum maintenance and maximum efficiency of operation.

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UNITED STATES STEEL

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A few continuously operating foundries even charge the cupola with a magnet.

How many tons per day do you handle? Have you a crane and if so, what lifting capacity? What kind of electric current do you use?

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JOHNSON AFTERCOOLER
Used where moisture is vaporized by the heat of compression. Circulates cooling water around the line, condenses the oil and water vapor so Separator can remove them. Simple in design, highly efficient in performance.

SIZES FOR ALL NEEDS

JOHNSON SEPARATOR
Removes more than 99% of all water, dirt and oil from compressed air or steam. Combines the two best principles of separation—first allows air to expand slightly, then changes flow direction with the "Thousand Baffles". Model illustrated is the newest idea in separator design, with self-draining trap mechanism built right in.

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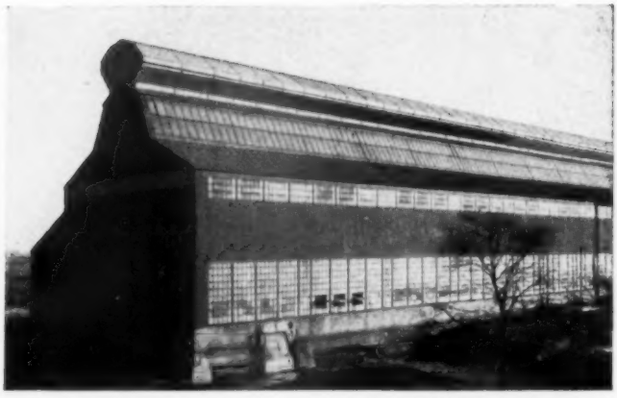
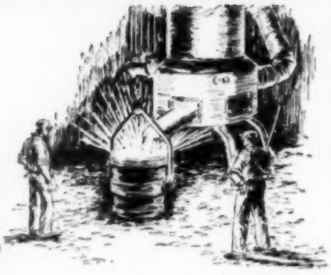


Swartwout

large scale ventilation



improves your working conditions—helps you attract more man-power

At a surprisingly economical cost you can make your foundry a much more attractive place to work in.

Swartwout Roof Ventilators and Intake Louvers, properly distributed to handle your ventilation problems, give you a fume, smoke and dust removal system that helps increase working efficiency and improve employee comfort.

Swartwout builds sturdy, scientifically designed ventilators for either gravity or power air movement—recommends effective combinations to provide most economical handling of your various ventilation needs. Write for full information.

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THE FOUNDRY

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A war-released alloy makes CERTIFIED do better cleaning, last longer

Users have noticed extra fast cleaning and extra long life now that a special alloy – unavailable during the war – has been added to CERTIFIED Samson Shot and Angular Grit. This alloy greatly increases the hardness of the virgin metal.

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Self Dumping

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

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"A Specific Type for Every Core Box"

- Made of brass and diameter held to close tolerance.
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Made in Colors
to conform to
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1. Prevents Warping, Swelling, Deterioration—in use or on the shelf.

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Hardlac comes ready mixed—saves valuable time. Brush or spray it on—it dries quickly to a smooth even surface.

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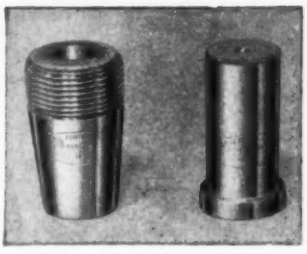
WHEREVER BLASTING IS DONE!



Wherever there is blast cleaning there ought to be a Federal Blast Nozzle. Made of cast tungsten-carbide (the hardest metal known to man) the Federal Blast Nozzle concentrates the blast, reduces air costs and outwears any nozzle previously offered for the purpose.

Being cast, the tungsten-carbide is pure—as is not the case when made by sintering.

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Made in several sizes; adapters can be furnished to fit all makes of blasting equipment.

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This 480-page book, is the answer to industry's demand for dependable, factual data on the subject of impact cleaning, including blast-cleaning and sand-blasting.

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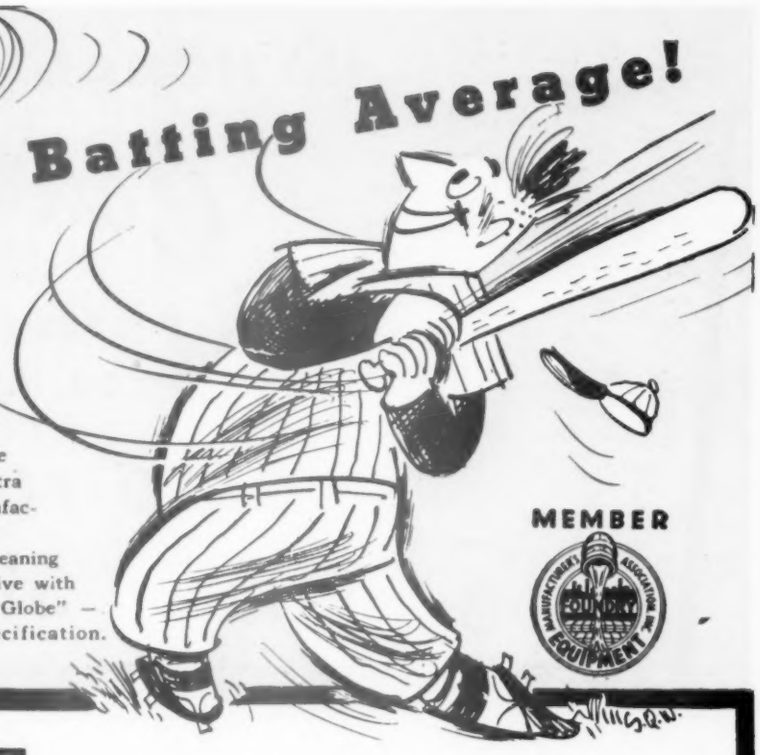

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Make sure you get maximum precision cleaning and longest service life by ordering the abrasive with maximum hardness and toughness. Specify "Globe" — all sizes graded to the new S. A. E. specification.

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NO. 4 DAYTON RING VALVE BENCH RAMMER

Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

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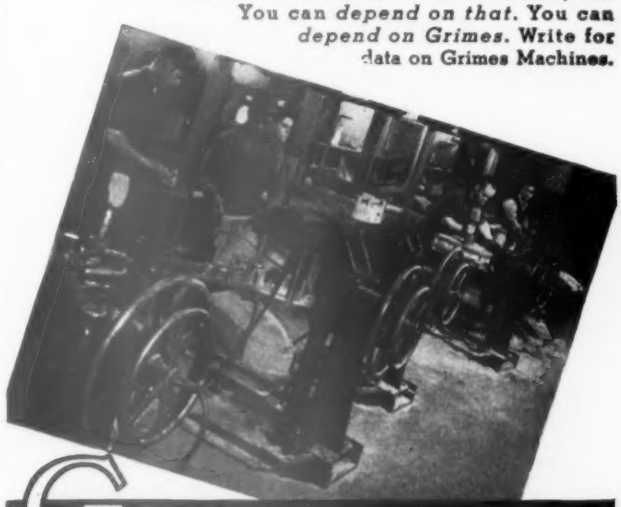

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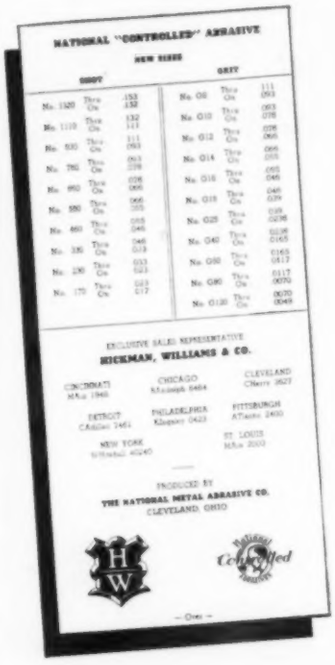

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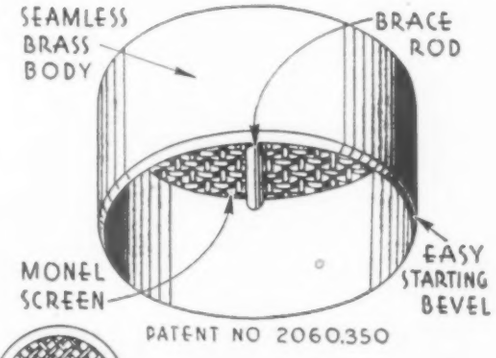

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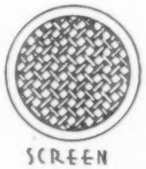

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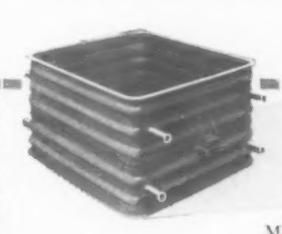
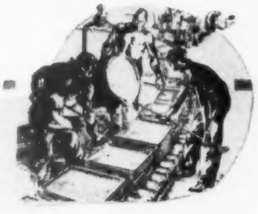
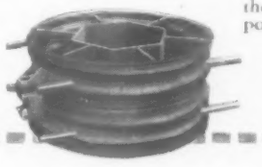
with
Truscon Steel Foundry Flasks







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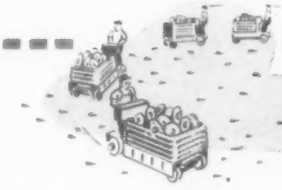

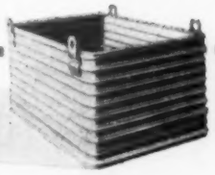

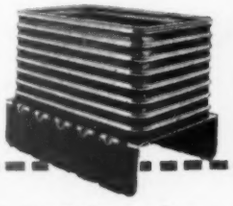

Move, deliver and store your parts and finished products *quicker and better* with Truscon Steel Boxes and Skids. You get more jobs done with greater hourly capacity.

Write for illustrated descriptive catalogs on Truscon Steel Foundry Flasks, and Truscon Steel Boxes and Skids, to help plan greater efficiency for your plant.

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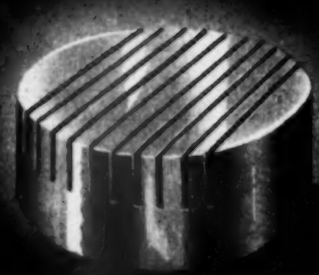

CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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Jolt Squeeze
MOLDING MACHINES

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10" SQUEEZE CYLINDER

4" JOLT CYLINDER

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SPEED UP MOLD DRYING with HAUCK Compressed Air Type Portable Burners

Compressed air or venturi suction torch burner outfits with wide range of flame sizes.

Complete heating units that produce a long, sooty flame, a medium reddish blue flame or a short, sharp blue flame for surface or spot drying or large or small molds. The Hauck is widely used in foundries. Burns fuel oil, kerosene or distillate; lights instantly; no preheating; adjustable flame size. Unconditionally guaranteed.

Investigate also Hauck Ladle Heaters, Cupola Lighters, Furnace Lining Dryers. Catalog on request.

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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Motors

Century Electric Co.—8-page illustrated bulletin form No. 643 describes 1 to 350-horsepower slip ring induction polyphase motors. Motors are recommended for use when high starting torque and low starting current are required in bringing heavy loads to speed, for adjustable varying speed applications and for reversing applications.

2. Air Conditioning

American Air Filter Co.—20-page illustrated booklet entitled "The Magic of Electronics in Air Filtration" traces history and development of air conditioning for industry. Theory and practice of electronics in air conditioning are presented. Application of electronically filtered air to industry is discussed.

3. Industrial Fork Truck

Crescent Truck Co.—4-page illustrated bulletin describes model MGVH Palletier fork truck available in capacities of 3000 and 4000 pounds. Units have backward tilt of 15 degrees, forward tilt of 5 degrees, maximum lift of 132 inches and 26-inch lift without increasing truck height. Specifications and advantages of design are given.

4. Ferroalloys

Chromium Mining & Smelting Corp.—8-page illustrated bulletin presents data and information on Chrom-X exothermic ferrochromium and Sil-X exothermic ferrosilicon. These ferroalloys can be added by foundrymen and steel plant operators without analysis and weighing and without chilling effect. They can be stored readily.

5. Crucible Melting Furnaces

Stromen Furnace & Engineering Co.—4-page illustrated bulletin No. 105 presents manual tilt crucible melting furnaces for brass, bronze and aluminum in capacities from No. 40 to No. 500 crucibles. Units are either gas or oil fired, or combination. Specifications are given.

6. Shakeout

Robins Conveyors Inc.—4-page illustrated bulletin No. 124-F describes portable Floatex shakeout equipped with automatic flask loader. Unit handles flasks weighing up to 250 pounds and lifts them, shakes out sand, and discharges castings on floor. Machine is electrically powered.

7. Centrifugal Casting Machine

Herman Pneumatic Machine Co.—4-page illustrated bulletin on Hydro-Centrifugal casting machine covers 12 features, specifications for 6 models, and includes dimension drawings and tables.

8. Dust Collectors

Aget-Detroit Co.—8-page illustrated catalog No. A-350 describes individual type Dustkop dust collectors suitable for collecting dust, dirt and lint from dry grinding, buffing and polishing machines. Specifications of models with ratings, together with prices and accessory equipment, are given.

9. Goggle Cleaning Cabinet

Mine Safety Appliances Co.—2-page bulletin No. CE-28 features goggle cleaning cabinet with Fogpruf for installation in mills, factories and other places where goggles are used. Cabinet is self-contained and is mounted on wall for convenience. It contains cleaning and fog-proofing compound and both supply and waste containers for tissues.

10. Mobile Crane

Unit Crane & Shovel Corp.—4-page illustrated bulletin No. 46-A presents Unit 357 self-propelled mobile crane which is quickly convertible to shovel, trenchoe, backfiller, clamshell, dragline, pile driver or magnet. Dimensional data and general specifications are given.

11. Pattern Lumber

Western Pine Association—Two 16-page booklets are entitled "Sugar Pine for Perfect Patterns" and "Idaho White Pine Ideal for Wood Patterns." Characteristics of these woods and their adaptability to pattern making are covered. Typical pattern room scenes are included and patterns made with this lumber are shown.

12. Materials Handling

Mercury Mfg. Co.—48-page illustrated pocket-size catalog No. 201-6 presents complete line of tractors, trailers and lift trucks. Booklet includes information on construction features, capacities and designs of all models. Gas tractors and telescopic lift trucks are described in full.

13. Pneumatic Tools

Keller Tool Co.—Illustrated catalog No. 12 presents complete line of pneumatic tools, including 14 new tools developed during the war. Included are air powered sawing and filing tool, impact wrench and lightweight air hoist in 300-pound, ¼-ton and ½-ton capacities.

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14. Aluminum Alloys

National Smelting Co.—13-page illustrated fileable folder describes series of Ternalloy aluminum alloys in aluminum-magnesium-zinc system for use by foundrymen. Unusual properties are result. Characteristics, specifications and advantages of use are outlined and illustrated with graphs. Methods of heat treatment are included.

15. Belt Conveyor Idlers

Chain Belt Co.—26-page illustrated bulletin No. 463 covers complete line of Rex belt conveyor idlers. Proper selection of idlers, details of construction and special applications are given. Impact-cushioning troughing idler and rubber covered spiral return idler are described in detail.

16. Refractory Concrete

Atlas Lumnite Cement Co.—24-page illustrated booklet contains basic information on materials and methods used in making refractory concrete for various temperature and insulating requirements. Section of booklet is devoted to heat-resistant concrete for foundations, floors and structures subject to soaking heat.

17. Waterproof Clothing

Archer Rubber Co.—8-page illustrated catalog describes line of waterproof industrial work clothing, raincoats and rubberized sports apparel. Synthetic materials are also covered. Jackets, overalls, aprons and leggings are included.

18. Flame Hardening

Air Reduction Sales Co.—16-page illustrated catalog No. 90 describes design and use of Airco flame hardening apparatus. Since equipment is light in weight and portable, wide use of apparatus without removal from assembly is possible. Equipment and accessories are described.

19. Rotary Positive Blowers

Roots-Connersville Blower Corp.—24-page illustrated bulletin No. 22; 23-B-12 includes installation photographs, characteristics curves, cross-sections and exploded views of rotary positive blowers in sizes handling from 5 to 50,000 cubic feet per minute at pressures up to 30 pounds per square inch, and for vacuums up to 28 inches.

20. Industrial Management

Emerson Engineers—12-page booklet entitled "Emerson Wage Incentive Plan" is designed to provide maximum production of desired quality at minimum waste, producing low unit cost and high wages. Plan is described briefly and comments by users are quoted.

21. Shot Peening

Pangborn Corp.—16-page illustrated booklet on shot peening covers study of process for increasing fatigue life of metals. It discusses application of shot peening to production requirements and gives performance data on practical use of method in metalworking fields.

22. Core Ovens

Despatch Oven Co.—8-page illustrated bulletin No. 31 presents batch type Coremaster foundry ovens. Sizes, specifications, typical installations and advantages of use are covered. Design and construction features are presented.

23. Dust Collector

Ideal Industries Inc.—4-page illustrated bulletin form No. DCB-1045 describes dust collector for installation on grinders, buffers, sanders, polishers, lathes and other machines. It removes abrasive dust, metal particles, fine chips, flakes and other dirt. Machine's design and specifications are covered.

24. Materials Handling Grab

Boyer-Campbell Co.—4-page illustrated catalog describes Granny Grip camlever mechanism and chain for handling heavily laden steel barrels, steel plate and similar material. Specifications and prices of two units, single and double strand types, are given. Four-strand model is described also.

25. Rotating Furnace

Romph Furnace Co.—4-page illustrated bulletin describes rotating furnace that combines rapid melting with low cost operation and improved quality of metal. Features and typical installations are covered.

26. Foundry Equipment

American Foundry Equipment Co.—Two illustrated catalogs, No. 25A describing model AM Sandcutter and No. 10A describing core rod straightener and shear machine, give specifications, operating data and dimensions.

27. Aluminum Alloys

Apex Smelting Co.—8-page illustrated bulletin entitled "Apex 50 Alloy" covers aluminum alloy with excellent casting characteristics. It has good mechanical properties, can be heat treated and anodized and is readily machined. It is pressure-tight.

28. Gravity Conveyors

Rapids-Standard Co.—16-page illustrated catalog No. C-142-C covers Rapid-Wheel gravity conveyors. Design features, construction, typical applications and suggested layouts are shown. Various models, accessories and Rapid-Power booster are presented.

29. Ladles

Whiting Corp.—Two 4-page illustrated bulletins describe features of Pour-Rite ladles for all foundry needs. Air-cooled trunnions eliminate warpage and distortion. Gear bracket for tilting ladle is shown in phantom view. Features are outlined in detail.

30. Nozzles & Refractories

Norton Co.—8-page illustrated folder describes Norbide nozzles for pressure blasting and Norton refractories including cements, RR alundum, combustion boats and slag hole blocks. Characteristics and recommended applications are covered.

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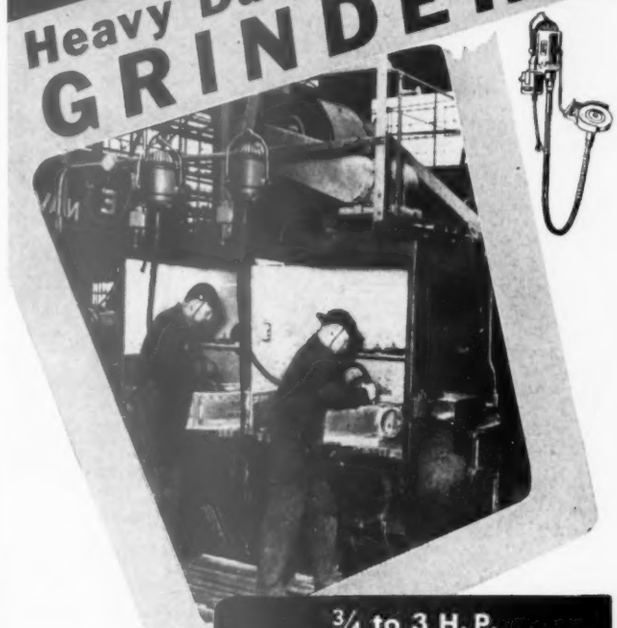

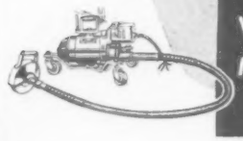

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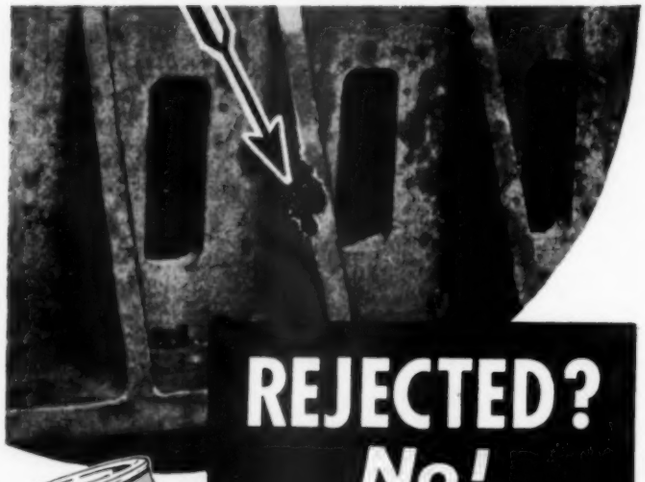

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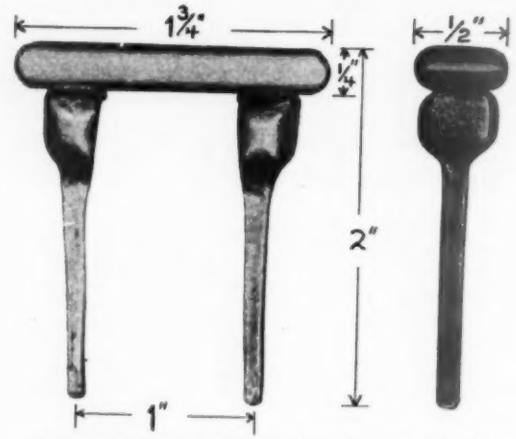

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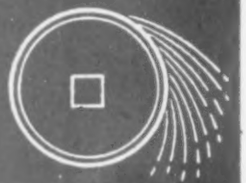

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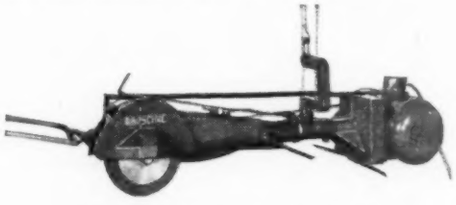

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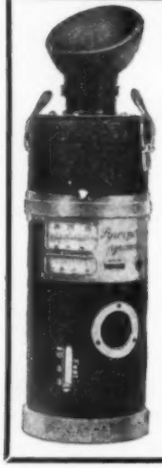

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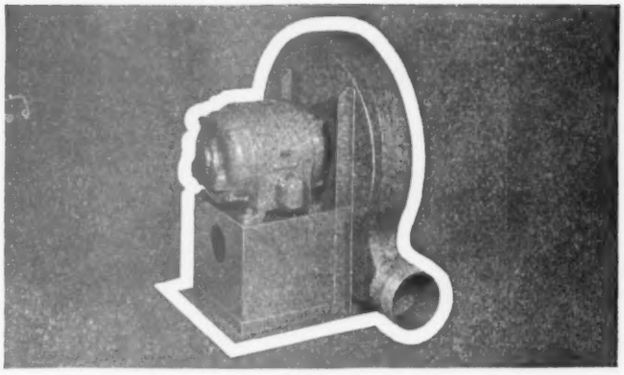

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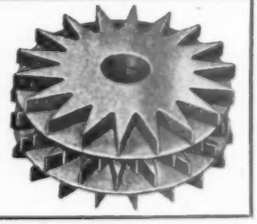

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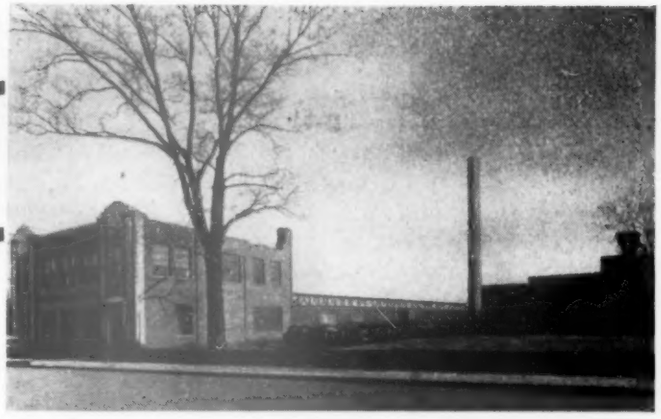

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American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CLUTCHES (Magnetic)

Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Co., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Republic Coal and Coke Co., 8. S. Michigan Ave., Chicago 3, Ill.; 1826 East 47th St., Cleveland, O.

COLLECTORS (Dust)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland, O.
Buell Engineering Co., 14 Cedar St., New York 5, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland 4, O.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

COMBUSTION EQUIPMENT

North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden. O.

CONTROL SYSTEMS (Dust)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Air Filter Co., 223 Central Ave., Louisville, Ky.
Buell Engineering Co., 14 Cedar St., New York 5, N. Y.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVERTERS (Bessemer)
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVERTER BLOWERS
Roots-Connersville Blower Corp., Connersville, Ind.

CONVEYORS (Belt)
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 29, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Material Movement Industries, 310 So. Michigan Ave., Chicago 4, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Inc., 70 Pine St., New York 5, N. Y.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYERS (Live Roller)
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

CONVEYORS (Pneumatic)
Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)
Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Material Movement Industries, 310 So. Michigan Ave., Chicago 4, Ill.

CONVEYORS (Portable-Gas Electric) (Cont'd)

CONVEYORS (Rubber)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)
Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Syntron Company, Homer City, Pa.

COPPER
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.

CORE BINDERS
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Certified Core Oil Div., Socony-Vacuum Oil Co., Inc., 3308 So. Cicero Ave., Chicago 50, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.
International Paper Co., 220 E. 42nd St., New York 17, N. Y.
Chas. A. Krause Milling Co., S. 43rd & Burnham St., Milwaukee, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 120 E. Pearson St., Chicago 11, Ill.

CORE BLOWING MACHINES
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.,

CORE BOXES
Newark Pattern and Machine Co., Newark, O.

CORE COMPOUND
Certified Core Oil Div., Socony-Vacuum Oil Co., Inc., 3308 So. Cicero Ave., Chicago 50, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.
International Paper Co., 220 E. 42nd St., New York 17, N. Y.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Velsicol Corp., 120 E. Pearson St., Chicago 11, Ill.

CORE DRAWER
Freeman Supply Co., Toledo 5, O.

CORE GRINDERS (Power Operated)
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES
Beardsley & Piper Co., The 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Malwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Newark Pattern and Machine Co., Newark, O.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

CORE OIL
Buckeye Products Co., 7022 Vine St., Cincinnati 16, O.
Certified Core Oil Div., Socony-Vacuum Oil Co., Inc., 3308 So. Cicero Ave., Chicago 50, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Gamlen Chemical Co., 1469 Spring Garden Ave., Pittsburgh 12, Pa.
Hoffman Foundry Supply Co., 1193 Main St., Cleveland, O.
Houghton Co., E. F., Philadelphia, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 120 E. Pearson St., Chicago 11, Ill.

CORE OVENS
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Machler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Mahon, R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York 17, N. Y.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

CORE PASTE
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE PLATES (Steel, Asbestos)
Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.

CORE PLATES (Steel, Asbestos) (cont'd)
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Youngstown 1, O.

CORE RODS
Bethlehem Steel Co., Bethlehem, Pa.

CORE RODS (Carbon, Graphite)
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

CORE ROD STRAIGHTENING and CUTTING MACHINERY
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

CORE SAND
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

CORE SAND MIXERS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 30, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

CORE SPRAYERS
Freeman Supply Co., 1152 Broadway, Toledo 5, O.

CORE TRAYS
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.

CORE VENTS
Demmler, Wm., & Bros., Kewanee, Ill.
PMS Co., 1701 Power Ave., Cleveland 14, O.
Rienacker Industries, 2035 Hilton Rd., Ferndale, Mich.
Sinel Co., 1405 Philadelphia Drive, Dayton 6, O.
Smillie, C. M., & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH
Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71 St., Cleveland 5, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Stevens, Frederic B., Inc., Detroit 26, Mich.

CORE WASH (Cont'd.)
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS
Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

CORE WIRE STRAIGHTENERS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

CORES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., Westfield, N. Y.

CRANES (Bucket)
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANE CONTROL (Electric)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CRANE LUBRICATING SYSTEMS
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Electric Traveling)
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

CRANES (Gantry)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 3960 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.

CRANES (Monorail) (cont'd)
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRUCIBLES
American Crucible Co., Shelton, Conn.
Electro Refractories & Alloys Corp. Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES
Ajax Electrothermic Corp., Trenton, N. J.
Camphell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 5525 N. Wolcott Ave., Chicago 40, Ill.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

CRUCIBLE LIFTERS
Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES
Modern Equipment Co., Port Washington, Wis.

CUPOLAS
Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS
Roots-Connersville Blower Corp., Connersville, Ind.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Fort Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT
Carman, Edwin S., Lee Rd., at Mayfield, Cleveland 18, O.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.
Ironton Fire Brick Co., Ironton, O.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio
United States Graphite Co., Saginaw, Mich.

CUPOLA SPARK ARRESTORS
Whiting Corp., 15607 Lathrop Ave., Chicago, Ill.

CUTOFF MACHINES (Abrasive)
Clipper Mfg. Co., 4030 Manchester, St. Louis, Mo.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CUTTING OILS
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.

DARK ROOM ACCESSORIES (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

DARK ROOM PROCESSING (Chemical Tanks, etc.)
Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS
American-British Chemical Inc., 180 Madison Ave., New York 16. New York 16, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS
Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
American Smelting & Refining Co., 120 Broadway, New York 5.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DESULPHURIZERS
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIES
Acme Aluminum Alloys Inc. 232 N. Findlay St., Dayton 3, O.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.

DOWEL PINS
Standard Horse Nail Corp., New Brighton, Pa.

DOWELS (Metal Adjustable)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

DRILLS (Electric)
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.

DRILLS (Pneumatic)
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Schrammn Inc., West Chester, Pa.

DRILL PRESSES
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

DUMP HOPPERS
Buda Company, Harvey, Ill.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUST ARRESTING EQUIPMENT
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

DUST ARRESTING EQUIPMENT (Cont'd.)
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Buell Engineering Co., 14 Cedar St., New York 5, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Mahon, R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland 4, O.
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee 12, Wis.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS
Goergen Machwirth Co. Inc., 817 Sycamore St., Buffalo, N. Y.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

DUST RECOVERY SYSTEMS
American Foundry Equipment Co., Mishawaka, Ind.
Buell Engineering Co., 14 Cedar St., New York City 5.
Kirk & Blum Mfg Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS
Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

ELEVATORS (Material Handling)
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)
Fuller Company, Catasaqua, Pa.

EMBOSSING MACHINES (Metal Labels)
Roovers Brothers, Inc., 3611 14th Ave., Brooklyn, N. Y.

ENGINEERING SERVICE (Foundry)
Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Carman, Edwin S., Lee Rd. at Mayfield, Cleveland 18, O.
Coffey Engineering Co., 308 Park Ave., Plainfield, N. J.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, O.
Emerson Engineers, The, 30 Rockefeller Plaza, New York, N. Y.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Reichert, W. G., Engineering Co., 1060 Broad St., Newark, N. J.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

EXHAUST SYSTEMS
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

EXHAUST SYSTEMS (cont'd)
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., Cleveland 4, O.
Propellair Inc., Springfield, O.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FABRICATORS (Metal)
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St. New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens Inc. Frederic B., Detroit 26, Mich.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
General Blower Co., 406 N. Peoria St., Chicago 22, Ill.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

FEEDERS (Rotary)
Fuller Company, Catasaqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FEEDERS (Sand)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, C
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME
Hickman-Williams & Co., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

FERROMOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILLET (Cement & Solvant)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

FILLET (Wax, leather, wood)
PMS Co., 1701 Power Ave., Cleveland 14, O.

FILM (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

FILTERS (Air)
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens Inc., Frederic B., Detroit 26, Mich.

FIRE CLAY
Eastern Clay Products, Inc., Eifort, O.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

FIRE SAND
Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FIRESTONE
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FLASK BANDS
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLASKS (Aluminum)
Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASKS (Dowmetal)
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASK FILLERS
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

FLASKS (Slip)
Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)
Adams Co., Dubuque, Iowa
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FLASKS (Steel)
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Youngstown 1, O.

FLASK FITTINGS
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Truscon Steel Co., Youngstown 1, O.

FLASK LUMBER
Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

FLASKS (Wood)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLEXIBLE SHAFT MACHINERY
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Strand Co., N. A., 5001 N. Wolcott Ave., Chicago 40, Ill.
Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago, Ill.

FLOORING (Non-Slip)
Norton Co., Worcester 6, Mass.

FLUXES
American British Chemical Inc., 180 Madison Ave., New York 16.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Chemical Products Co., 8514 Cedar, Cleveland 6, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
United Flux Co., 7016 Euclid Ave., Cleveland, O.

FOUNDRY LAYOUT & METHODS
Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.

FOUNDRY NAILS
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Hoffman Foundry Supply Co., 1193 Main St., Cleveland, Ohio.
Midwest Foundry Supply Co., Edwardsville, Ill.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FURNACES (Aluminum & Magnesium Billets)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES (Aluminum & Magnesium Forgings)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Kirk-Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
W. S. Rockwell Co., 56 Church St., New York 17, N. Y.

FURNACES (Aluminum Melting)
Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Aluminum Rivet Heating)
Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minneapolis 14, Minn.

FURNACES (Annealing)
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, Ohio.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Eclipse Fuel Engrg. Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Radiant Combustion Inc. Warren, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Forging)
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

FURNACES (Gas or Oil Fired)
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.

FURNACES (Gas or Oil Fired) (cont'd)

Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
Radiant Combustion Inc., Warren, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Radiant Combustion Inc., Warren, Ohio.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
General Electric Co., Schenectady, N. Y.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., 300-330 Moore St., Harrison, O.

FURNACES (Nonferrous Melting) (cont'd)

Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnson Fuller Co., 1366 So. Flower St., Los Angeles 15, California.
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
United States Graphite Co., Saginaw, Mich.

GAGES

Acme Aluminum Alloys Co. Inc., 232 N. Findlay St., Dayton 3, O.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

GAS

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

GAS BURNERS

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.

GLUE POTS (Electric)

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

GRAPHITE

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Co., Grand Haven, Mich.

GRINDERS (Surface, Bench, Disc, Floor)

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.
Western Tool & Mfg. Co., Springfield, Ohio.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co.,

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Michigan.

GRIT (Abrasive) (cont'd)

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Western Metal Abrasive Co., 2545 East 79th St., Cleveland 4, O.

GYPSUM CEMENT

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Direct Fired)

Despatch Oven Co., Minneapolis 14, Minn.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (Gas, Oil, Electric)

American Foundry Equipment Co., Mishawaka, Ind.
Despatch Oven Co., Minneapolis 14, Minn.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Despatch Oven Co., Minneapolis 14, Minn.

HEATERS (Liquid, Steam)

Johnson Corporation, Three Rivers, Mich.

HEATERS (Space, Unit, Oven, Water)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Maehler, Paul Co., 2200 W. Lake St., Chicago 12, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

HELMETS (Blasting)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.

HOISTS (Chain)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Electric)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Hand)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Clipper Mfg. Co., 4030 Manchester, St. Louis, Mo.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.
Kerkling & Co., Burbank, Calif.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Magnesium)

Dow Chemical Co., Midland, Mich.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
Aluminum Company of America, Pittsburgh, Pa.
Aluminum & Magnesium Inc., Sandusky, O.
American Smelting & Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., Chicago, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR, Cleveland 13, O.
Federated Metals Div., American Smelting & Ref. Co., New York 5.
General Smelting Co., Philadelphia, Pa.
International Nickel Co., Inc., 67 Wall St., New York City 5.
Jobbins, Wm. F., Inc., Aurora, Ill
Lavin & Sons R., Inc., Chicago, Ill.
National Smelting Co., Cleveland, O.

INGOTS (Nonferrous) (cont'd)

Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, New York.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City, Kan.
U. S. Metals Refining Co., New York.
U. S. Reduction Co., E. Chicago, Ind.

INSPECTION (Cast Metals)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Fluorescent Penetrant)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Magnetic Particle)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSULATORS (for casting heads)

Houghton Co., E. F., Philadelphia, Pa.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 3, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.

LABORATORY EQUIPMENT (Physical)

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
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Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
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Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

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Wanted man of Superintendent or General Foreman caliber, experienced in modern grey iron foundry practices and methods in an Ohio production foundry with 200 employees. Should be familiar with machine molding, both squeezer and cope and drag. Give full information, training experience, and personal status. Address: Box 849, The FOUNDRY, Cleveland 13, Ohio.

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Well established jobbing foundry in Michigan community desires services of competent and aggressive foundry superintendent. Foundry has handled jobbing work during its forty-year history but is now branching into semi-production work. Man must be able to take full charge of foundry, core room and cupola in foundry that now employs ten molders. Will pay good salary plus attractive bonus plan for qualified man looking for a future. Give age, record of experience and salary desired in first letter. Address: Box 838, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY ENGINEER

Experienced man capable of installing new incentive plan in various departments in foundry. Must have experience in cost estimating. State age, education, experience in detail and salary requirements. Address Box 832, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

WANTED
GENERAL PLANT SUPERINTENDENT

Experienced nonferrous smelting or foundry operations, preferably light metals, proved administrative ability, successful experience in modern plant management, with good technical background. Excellent opportunity with long established mid-western company enjoying highest reputation. Write giving full details. Address Box 818, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT SALES EXECUTIVE

Wanted to take over sales supervision under Vice-President of well-established raw materials company of excellent reputation selling to steel mills and foundries. Position offers opportunity to assume sales management. Must be sales and commercial minded with actual selling experience. Metallurgical knowledge desirable but not essential. Age 40 to 45. State experience, references and salary expected. All replies confidential. Address Box 820, The FOUNDRY, Cleveland 13, Ohio.

DISTRIBUTOR

OR

FACTORY REPRESENTATIVE

To represent midwest manufacturer of quality blast cleaning and surface peening, STEEL SHOT AND GRIT, for use in foundries, drop forge, heat treat and miscellaneous metal industries. No objection to other lines. Field cooperation and national advertising. Substantial commissions. Write for information.

BOX 835
THE FOUNDRY CLEVELAND 13, OHIO

FOUNDRY FOREMAN

for

Sand Slinger Floors

Squeezer Molding

Rollover Machine Floors

Must be experienced in Mechanized Grey Iron Foundry operations. State qualifications, salary expected and include photograph in first letter. Plant located in Midwest industrial area.

BOX 717

The FOUNDRY CLEVELAND 13, OHIO

Help Wanted

DIE CASTING DIE DESIGNER

Immediate opening for die casting die designer. Experienced on zinc or aluminum dies. Must be thoroughly experienced in all phases of die cast die designing. Large well established manufacturer of electrical appliances located in North Eastern Ohio. Living conditions good in small town or medium size city. Address replies giving complete personal and work history to:

BOX 774
THE FOUNDRY CLEVELAND 13, OHIO

ASSISTANT SUPERINTENDENT or GENERAL FOREMAN

Must be capable of handling all phases of production in general jobbing foundry employing 75 men. This firm recently reorganized and growing rapidly. Good background in squeezer and machine production also necessary. This is an unusual opportunity for a man between 35 and 45 to develop with the Company. Excellent salary and bonus. Location—Western Pennsylvania. Address Box 825, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Middlewest Foundry. Normal production 15 to 20 tons daily. Must be able to handle men and direct operation of cupola. Work consists of small castings on squeeze machines and other machine work, together with floor molding. Castings usually running up to three or four hundred pounds and occasionally die blocks weighing one to two tons. Applicants please state salary desired and when available. Address: Box 809, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM FOUNDRY SUPERINTENDENT

Wanted by aluminum jobbing foundry located in Western New York, producing quality castings of medium and small size, a superintendent capable of taking complete charge of foundry operations. Must be able to handle men, be capable of rigging patterns for best production and assist in estimates. Should have experience in permanent molding. Aluminum foundry employs about 125 people. State age, education, experience and salary expected. Address: Box 854, The FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER

Well established Ohio manufacturer with normal employment of 600, and located in city of 40,000, seeks services of Works Manager with thorough knowledge of gray iron foundry operations. He is to supervise production, engineering and operating departments. Tact and ability to get things done most essential. State age, education, give experience in detail and specify salary bracket. Address Box 823, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Help Wanted

POSITION AVAILABLE

Raw Material salesman, age 30 to 40, with experience in selling to steel plants and foundries, wanted by well established producer with excellent reputation in the field. Territory east central states. Salary, Traveling expenses and bonus. State experience, references and salary expected. All replies confidential. Address Box 819, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

For gray iron jobbing production foundry, operating on continuous pouring. Mostly squeezer work. Prefer man who has had experience in a continuous pouring mechanized foundry.

NATIONAL FOUNDRY CO.
10 SANDFORD ST.
BROOKLYN, N. Y.

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

WANTED

SALESMEN or MANUFACTURERS' AGENTS Now calling on foundries and forgings companies to handle complete line of Missouri refractories. Write in detail giving territories now covered, products handled, qualifications, etc. **Address: Sales Manager, Chicago Fire Brick Company, 1467 Elston Ave., Chicago 22, Ill.**

FOUNDRY SUPERINTENDENT

First class radiator foundry superintendent. Consideration will be given only to applicants with A-1 qualifications and having at least ten years' experience in this type of work. Give full information as to age, experience, etc. Write: Box 698, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

With experience in aluminum. Want man who has had production experience with core blowing machines. Must be able to train new employees. Jobbing foundry mostly light work. Location Western New York. State age, qualifications, references and salary expected. Address: Box 803, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

New gray iron light production shop will start operation about first of year. Will give complete charge of production to well qualified man. State full particulars, age, experience, salary desired, e'c. Address: Box 807, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

To take complete charge of small combination grey iron and nonferrous foundry on salary plus share of profits. Middlewest location. Address: Box 839, The FOUNDRY, Cleveland 13, Ohio.

MAINTENANCE FOREMAN

Non-ferrous foundry employing over 200 employees wants master mechanic capable of handling small maintenance gang. Must be energetic man who sees opportunities for improved layout and methods and can get things done. Located New York State. State age, qualifications, references and salary expected. Address: Box 802, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY MANAGER

For general management of two production grey iron foundries in Ohio affiliated with nationally known company. Must know foundry practice, equipment, and methods, and be able to organize and secure cooperation from employees and associates. College or Technical education preferred. Address: Box 850, The FOUNDRY Cleveland 13, Ohio.

FOUNDRY FOREMAN

Small Northwestern Ohio gray iron foundry wants foreman experienced in the production of small and medium castings. Position available immediately. State age, experience and salary desired. Address: Box 720, The FOUNDRY, Cleveland 13, Ohio.

MELTING ROOM FOREMAN

Bronze Foundry melting approximately 30,000 pounds per day. Want man capable of handling men and operating pit and tilting oil-fired furnaces. Plant located on Lake Erie. State qualifications, references, age and salary expected. Address: Box 801, The FOUNDRY, Cleveland 13, Ohio.

BRASS AND ALUMINUM FOREMAN

To take charge of 10 squeezer molders. Must have 10 years' experience and be a hustler. State wages required and qualifications in first letter. Address: Box 808, The FOUNDRY, Cleveland 13, Ohio.

MOULDERS WANTED

On Tablet and Ornamental Bronzes. State age, last places worked and when you can start work. Eight hour day, forty hour week. Steady job. Address Box 816, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Experienced on squeezer molding operations, light production work. Capable of handling one section of gray iron foundry. For old established firm in Chicago. Write stating qualifications. Address Box 827 The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Small gray iron foundry in Southern Michigan desires an experienced foundry man to take over complete operation. Must have full knowledge of all phases of gray iron production. Give full information as to qualifications, age, salary required, etc. Address Box 821, The FOUNDRY, Cleveland 13, Ohio.

WANTED FOUNDRY SUPERINTENDENT

Aluminum foundry in Chicago area employing ten molders. Excellent opportunity. Give references and state salary expected. Address Box 828 The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

For gray iron foundry making production castings. General knowledge of engineering, metallurgy, manufacturing and purchasing procedure desired. Must be able to travel. Address: Box 806, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

For well established gray iron foundry located in good Minnesota town. Give full details, qualifications, past experience, salary requirements etc. Address Box 830, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT

First Class foundry superintendent for a foundry employing 300 men producing gray iron castings. Located in New Jersey. Write giving full particulars as to age, experience, reference, etc., to Box 699, The FOUNDRY, Cleveland 13, Ohio.

PATTERN MAKER

Experienced on master patterns, core boxes for production brass foundry producing small castings. Good working conditions, small town, year around job. Give full information about yourself in first letter. Address: Box 805, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN OR SUPERINTENDENT

Wanted to supervise operation of steel foundry on Pacific Coast with capacity of 400 tons per month. Must be cost minded and have ability to properly handle men. State experience, technical education, also salary desired. Address: Box 804, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Must have knowledge of bench, rollover and core blower machines. Must have experience in production of gray iron foundry. Substantial salary. Address Box 833, The FOUNDRY, Cleveland 13, Ohio.

SALESMEN WANTED

A large grinding wheel company has openings in Chicago and Milwaukee for salesmen with grinding wheel experience. Good future for right men. Please send your qualifications as to years of wheel sales experience, present territory travelled and age. Address Box 812, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

GREY IRON CASTING SALESMAN

Working out of Newark, N. J. wants to represent foundry producing first class work. Now handling patterns, castings, machine work and machinery building. Knows foundry business and will select suitable work for your shop. Has own office. Commission basis. Address: Box 847, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Practical iron foundryman. Technically trained. Has broad working knowledge of all foundry activities in production and jobbing foundries. Experienced in mold conveying, sand preparation and distribution. Had charge of foundries producing up to 125 tons daily. Good record handling union labor. East or Middle West preferred. Address: Box 846, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY, STANDARDS & METHODS SUPERVISOR

What have you to offer a supervisor with 20 years' experience in the malleable, grey iron and steel foundry industry. Capable leader with good ideas, able to set up standards in all departments that will stand the test and before you realize it your cost will be reduced and production increased beyond expectations. Valuable experience on job evaluation. Address: Box 799, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT—MANAGER

Age 43 Metallurgist. Wide experience specialty steel. Rolled and cast products. Heavy on centrifugally cast tubing. Expert on electric arc melting. Address: Box 842, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Foundryman with considerable experience in making light castings both malleable and grey iron wants position as foundry manager. Address Box No. 811, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

NOW AVAILABLE

Director or Assistant Director of industrial relations. Nine years experience as Director in foundry and steel plant. Mid-West location preferred. References. Address Box 831, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Practical foundry executive desires connection High Tensil manganese bronze, aluminum and copper; valves, water supplies, marine and builders hardware. Desire interview. Available October 20th. Salary secondary. Address Box 815, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Wants to make new connection. Practical experience with technical training and cost minded. Experienced with work ranging from a few pounds to ten ton. Good rigger for production. Understand gray iron metallurgy. Mix iron by analysis. A1 cupola supervision. Capable of handling a foundry organization as top management, assistant to a busy executive or as a foundry superintendent. Middle age. Good personality. Address Box 834, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE AT ONCE

Practical nonferrous foundry executive would like to connect with a foundry supply house, crucible manufacturer or any kindred line. Have had road experience; available November 1st. Could qualify as trouble-shooter. Address Box 814, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Wide experience in all departments. 25 years' superintendent. Practical and technical training, high grade medium and heavy jobbing and production, gray iron and semi-steel castings, green and dry sand. Best of cupola practice. Address: Box 550, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

With 20 years' experience as molder in gray iron and nonferrous foundries desires position as foreman on light production or jobbing or soil pipe and fittings. Western or central New York state preferred. Address: Box 785, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

THOROUGH KNOWLEDGE OF ALUMINUM AND MAGNESIUM, MODERN PRODUCTION METHODS, TIME STUDY, INDUSTRIAL RELATIONS. REFERENCES EXCHANGED. WRITE: W. C. A., 105 BAMFORD AVE., HAWTHORNE, N. J.

POSITION WANTED—METALLURGIST

Metallurgically trained young man—B.S. in M.E. —two years well grounded experience in steel and cast iron metallurgy before entering U. S. Navy. At present shift foreman in nonferrous smelter. Address Box 826 The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS
SALES MANAGER OR PLANT EXECUTIVE

Eight years' nonferrous experience sales and manufacturing. Fifteen years' industrial experience. 37 years old, married, honest, dependable, excellent references. Address: Box 784, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN

OF WIDE EXPERIENCE AND SUCCESSFUL RECORD IS OPEN FOR ENGAGEMENT IN MEDIUM SIZED FOUNDRY IN CHICAGO AREA. UNEXCELLED AS TROUBLE SHOOTER. ADDRESS: BOX 851, The FOUNDRY, CLEVELAND 13, OHIO.

Positions Wanted

SALES DIVISION

Twenty-five years' experience in ferrous and nonferrous industries. Intimate knowledge, supervisory capacity, operation, engineering and sales. Carnegie Tech graduate. Desires connection in Sales with foundry or sales representative organization. Age 48. References. Address: Box 760, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales, finance and production. Excellent experience machinery, tool, foundry and related lines. Address: Box 445, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT, GENERAL FOREMAN

For grey iron jobbing shop. Practical man on light, medium and heavy work with core room and good cupola practice. Employed, 25 years' executive experience. Address: Box 845, The FOUNDRY, Cleveland 13, Ohio.

BRASS AND IRON FOREMAN

Fourteen years experience in the most modern and complete foundry of U. S. Navy. Two years supervising sand conditioning systems and sand testing laboratory. Well experienced in steel molding and synthetic sands. Age 34, married, physically fit and willing to work. Address Box 829, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE

Foundry and Industrial Engineer on consulting basis or short term contract to aid small foundries establish, revise and maintain job evaluation, wage incentive, foundry methods, sand control, plant layout. 15 years experience in gray iron, malleable and steel. Address Box 813, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Diversified experience in gray iron and steel. Outstanding record of accomplishment trouble shooting on production. Skilled in foundry layout, plant design and mechanization. Well versed on scientific melting and mixing. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Capable of taking over shop, estimate cost and layout work to produce accurate sound castings. General pattern shop experience both wood and metal patterns and driers and core blowing. Ability to handle men and train apprentice. First class mechanic and can qualify as working foreman in small shop or supervise large shop. Address: Box 779, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN
OR
SUPERINTENDENT

A practical trained foundryman well versed in nonferrous aluminum and magnesium castings. Twenty years foundry experience—the last twelve years in aluminum and magnesium. Would like to make a change from present position. Available on short notice. Address: Box 840, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Young foundryman with 8 years' experience in grey iron, malleable and steel including supervision of coremaking, molding, sand control, gating and engineering desires position in progressive foundry organization or will consider sales and service to foundries. B. S. degree in metallurgical engineering. Address: Box 843, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

IRON FOUNDRIES—large and small. Producing light, medium and heavy castings. Some with machine shops. Locations East.

FOUNDRY BUILDING—24,000 sq. ft. 2 cupolas. $50,000. Providence, R. I.

EDWARD H. ZOLL
Industrial Properties Throughout the East
790 Broad St. Newark 2, N. J.
Phone—MArket 3-4539

FOR SALE

Aluminum and brass foundry in Indiana 125 miles from Chicago. Good transportation, plenty of orders, good labor supply. Well equipped and an excellent buy. Address: Box 855, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

North Central Pennsylvania. Employes 25 men, gross about $150,000 a year. Sale price depending upon inventory estimated at $20,000. Address: Box 767, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small foundry in Middle West, equipped for the making of brass, malleable or grey iron. Address: Box 852, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry and machine shop in small southern Ohio town. Address: Box 848, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Iron, aluminum and brass foundry in Southeastern Ohio. Cupola capacity 2 tons per hour. Good backlog for iron machinery castings. No labor problem. Reason for selling, illness. Price forty thousand dollars. Address: Box 844, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

OPEN CAPACITY

Jobbing foundry has open capacity for sand cast, light to medium weight aluminum castings.
C. I. LEE & SONS
Aluminum Foundry
527 Nebraska St., Farley, Iowa.

OPEN CAPACITY

New modern foundry just completed now booking orders for gray iron castings. 12,000 square feet floor space. Squeezer work preferred. Castings from 1 to 20 pounds. All new jolt squeezer molding machines. Location Central Illinois. Excellent transportation facilities. Inquiries answered promptly. Address Box 822, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Open capacity for Brass and Aluminum castings. Small and medium sized. Address: BRASS & ALUMINUM FOUNDRY, MANSFIELD, OHIO.

OPEN CAPACITY

For brass, bronze and aluminum castings—small and medium sized. For quotations write: Newberry Foundry, P. O. Box 125, Newberry Station, Williamsport, Pa.

Classified Advertising

Correspondence Course

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact it offers you food for thought. Our system is worth the fee as a desk reference. Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE., MILWAUKEE 12, WIS.

Capacity Wanted

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

Wanted-To-Buy

WANTED

One size 36" x 42" wheelabrator with loading device. One number 2 Simpson muller. State condition and price to

CROWN PIPE & FOUNDRY CO., INC.
JACKSON, OHIO

WANTED

Sand Blast Room complete with Dust Collector, Separator, etc.

Size 8' x 10' to 12' x 12' or a size near this range.

If you have equipment of this type give name of maker, model number, age, condition and price and where located.

ADDRESS BOX 841
THE FOUNDRY
CLEVELAND 13, OHIO

WANTED

American Wheelabrator size 27" x 36" complete with motors and loading skip and miscellaneous repair parts. Must be in good operating condition.

NOBLESVILLE CASTINGS CO.
Noblesville, Indiana.

Wanted-To-Buy

WANTED TO BUY

Two Jolt Pin Lift Molding Machines, new or used condition, to fit 40" square flasks. If used state guaranteed condition and price. Address Box 817, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED TO BUY

Tumbling Mills, cylindrical, motor driven preferred, 18" to 48" diameter, 60" to 84" in length. Advise condition and price in reply.

TAYLOR & CO. INC.,
Brooklyn 22, New York.

MIXER WANTED

Muller—no smaller than 5 cu. ft.

W. N. RUSSEL & CO.
34 ALBERTSON AVE.
WESTMONT, N. J.

WANTED

Small rotoblast or wheelabrator for small foundry. Address: Box 837, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

WANTED

Foundry to make grey iron castings. Patterns mounted for roll-over equipment, six patterns in all. Will need approximately 40 tons per month. Castings must be machinable, average weight—100 lbs.

THE PECK, STOW & WILCOX CO.
SOUTHINGTON, CONN.

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

For Sale

CENTRIFUGAL COMPRESSORS AND BLOWERS

5000 cfm @2# Spencer CC with 75 HP 3/60/1750 RPM motor.
1250 cfm @1# Buffalo 7x7 Brass & Bronze Blower with 10 HP 3600 RPM motor.
1200 cfm Buffalo, 9½ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
800 cfm @1½# American Sirroco blower with 10 HP 3/60/3600 RPM motor.
600 cfm @3# Spencer turb. blower with 10 HP, 1700 RPM motor.
225-400 cfm @1# Sturtevant CC with 3 HP 3/60/3600 RPM motor.
20¼ x 16¼ x 18¼ Allington and Curtis No. 55 (belt drive).
10½ x 10½ American size 5 (belt drive).
(2) 8 x 8 Sturtevant size 21061-9 (belt drive).

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

REBUILT EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed.

HAYNES FOUNDRY EQUIPMENT COMPANY
814 ADA ST. KALAMAZOO 21, MICH.

For Sale

REBUILT EQUIPMENT IN STOCK

Molding Machines

2—International Type F 24" x 10" Stationary Power Jolt, Roliover, and 10" draw.
1—Plain Jolt 36" x 48" Table 12" dia. cyl.
1—Plain Jolt 42" x 60" Table 17" dia. cyl.
1—Plain Jolt 48" x 72" Table 14" dia. cyl.
2—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3" cyl. Core Jolt with 20" x 15" table.

Metal Melting Equipment

1—Small Portable Core Oven—Gas fired—Swinging shelf type.
New 32" to 41" dia. shell cupolas made to order.
1—Monarch Tilting Iron Pot Aluminum Furnace 100 lbs. cap. Gas or Oil.
2—Hausfeld Tilting Crucible Aluminum Furnaces 33" dia. shell. Gas or Oil.
2—Hausfeld Open Flame Tilting Brass Furnaces 400 lbs. cap. Gas or Oil.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.

Blowers for Cupolas and Furnaces

Maxon-Premix Blower Sets for Gas ⅛ to 1 H.P. Motor Driven Centrifugal blowers to 2 lbs. press. Belt Driven Centrifugal blowers for Cupolas.

Tumbling Mills and Sand Blast

1—Barrel Type Magnetic Separator—AC driven with DC generator.
3—Portable Sand Blast generator tanks 500 lbs. sand capacity.
2—4000 lbs. cap. Tilting Crane Ladies, V-bail worm geared.
1—Approx. 8 cu. ft. cap. tilting trough type sand mixer.
Air Compressors 1 to 60 H.P.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

480 pcs. 14" x ¼" x 1" Manhattan Rubber Grinding Wheels 20 & BF 206 BM
450 pcs. 14" x ⅜" x 1" Manhattan Rubber Grinding Wheels 46 GF 106
51 pcs. 14" x ¼" x ⅝" Manhattan Rubber Grinding Wheels 46 GF 106
56 pcs. 14" x ⅜" x ⅝" Manhattan Rubber Grinding Wheels 46 GF 106
100 pcs. 6" x ½" x ⅝" Abrasive Co. Rubber Grinding Wheels 24 Q BH 6

All above are new, never used and f.o.b. East St. Louis, Illinois and packed free keg or barrel lots. Priced below present ceilings at about 1942 prices.

STERLING STEEL CASTING CO.
East St. Louis, Illinois.

FOR SALE
HEAT TREATING OVENS

1—Oil: 30" x 24" x 84".
1—Gas: 18" x 47" x 45".
3—Gas—Baker #24: 13" x 8" x 24".
1—Am. Gas. Furn.: 20" x 10" x 27".
1—Kindt Collins Model 201G Gas Melting Furnace.
2—Centrifugal Casting Machine Co. Model AS vertical type 41" table crucible arms and center pour fixtures.
1—ditto model "J" on stand 24" table.

AMERICAN ABRASIVE METALS CO.
IRVINGTON, N. J.

FOR SALE

1—Whiting, Type "A", roller bearing, motor driven tumbler, 30" diameter x 72" long, shell 1" thick; complete with 5 H.P. gear motor, magnetic starter, disc brake and motor driven exhaust fan. Very latest type. Brand new, never set up.

STAR MACHINE & FOUNDRY CO.
1209 LINCOLN ST.
AMARILLO, TEXAS

Classified Advertising

For Sale

OVERHEAD CRANES

1-Ton
Whiting 33′ Span
Curtis 24′ Span
1¼-Ton
Shepard Niles 25′6″ Span
P & H 34′ Span
2-Ton
Louden 19′2″ Span
Box 36′9″ Span
Detroit 28′ Span
3-Ton
Shaw 33′ Span
P & H 25′ Span
Northern 22′ Span
Manning, Maxwell & Moore 48′¾″
"Conco" 48′ and 26′6″ Spans
5-Ton
Whiting 47′4″ Span
38′10½″ Span D.C.
Northern 30′9″ Span
Milwaukee 70′ Span
Milwaukee 66′9″ Span
Manning, Maxwell & Moore 70′ Span
Manning, Maxwell & Moore 47′4″ Span
Shaw 36′ Span
Champion 37′6″ Span
American 70′ Span
American 47′4″ Span
6-Ton
P & H 77′ Span
American 77′ Span
7½-Ton
Shepard 36′ Span
10-Ton
Shaw 68′ Span
Shaw 73′ Span
P & H 30′ Span
P & H 87′6″ Span
P & H 80′ Span
Northern 71′10½″ Span
Northern 60′ Span
Morgan 55′6″ Span
Morgan 39′5″ Span
Morgan 52′3″ Span
Milwaukee 66′9″ Span
McGill 85′ Span
Lane 50′ Span
Emsco 75′ Span
Dominion 35′ Span
Cleveland 38′1½″ Span
Cleveland 50′ Span
Alliance 71′10½″ Span
Alliance 58′9″ Span
Albany 60′ Span
15-Ton
Whiting 71′10½″ Span
Northern 53′ Span
Erie 60′ Span
Chesapeake 55′6″ Span
Case 51′ Span
20-Ton
Shepard Niles 49′6″ Span
P & H 51′4″ Span
Northern 60′ Span
Morgan 60′ Span
Cleveland 65′ Span
25-Ton
Whiting 106′ Span
Tysaman 60′ Span
P & H 70′ Span
Morgan 52′3″ Span
Cleveland 106′ Span
Case 63′ Span
Bedford 50′ Span
30-Ton
Whiting 80′ Span
P & H 80′ Span
P & H 60′ Span
Morgan 30′ Span
Case 41′ Span
35-Ton
Bedford 50′ Span
Northern 22′ Span
50-Ton
Shaw 95′ Span
Shaw 69′10″ Span
Dominion 80′ Span
Cleveland 71′10½″ Span
75-Ton
Morgan 59′2½″ Span
Alliance 78′ Span
Alliance 37′ Span
80-Ton
American 40′6″ Span
125-Ton
Morgan 100′ Span
150-Ton
Whiting 30′ Span
175-Ton
Morgan 54′ Span
200-Ton
Alliance 100′ Span

Telephone us collect to discuss your requirements.

ECONOMY CO., INC.
49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
Telephones: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2290, 4-8292

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.

1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12″ dia. Pattern draw 18″ max. flask limit 64″.

1—46″ dia. x 56″ inside length tumbling barrels.

2—30″ dia. x 42″ inside length tumbling barrels.

BOX 635
The FOUNDRY CLEVELAND 13, OHIO

EQUIPMENT FOR SALE

We have moved to our new shop which enables us to give immediate delivery on 10 and 11″ Haynes squeezers. We will appreciate your business.

1—Curtis Air Compressor with tank.
1—Worthington Air Compressor.
1—Ingersoll Rand Air Compressor.
14—Steel Cabinets and Lockers.
1—Lot Conveyors complete with stands and Curves.
1—Electro Lift.
1—Water Tumbler.
1—No. 50 Large Exhaust Fan.
20—Skids.
1—Battery Lift Truck, table 40″ long, 30″ wide, 10″ from floor, lift 3″.
2—Jeffrey Sand Conditioners.
10—New #40 Crucibles.

HAYNES FOUNDRY EQUIPMENT CO.
1734 LAKE ST. KALAMAZOO 21, MICH.

FOR SALE

ONE (1) Three-Phase Tilting Type Wile Electric Arc Furnace, 500 lb. capacity, complete with 400 KVA Power Transformer, G.E. Control Panel, Oil Circuit Breaker, and accessories.

MR. F. R. WHEELER, METROLOY COMPANY,
NEW ROCHELLE, NEW YORK
FOrdham 7-8890, New Rochelle 2-2200

FOR SALE

One cupola, 72″ in diameter, like new, with blower, etc. Address: Box 836, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

2 Model 76J Osborn Jolt Squeeze Machines.
1 Jolt Stripper 20″ x 35″

For further information write

Loren W. Beutler
506 W. Prospect Ave. Jackson, Michigan

FOR SALE

Complete set of cast iron molds to make cored and solid bronze bar stock in 13″ lengths.

BOX 781
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Four aluminum melting furnaces, 1000 lbs. capacity, Fisher nose-tilting type, electrically controlled. Excellent condition. Sell or trade for 1000-lb. barrel type furnaces.

UNIVERTICAL MACHINE CO.
14831 W. Eleven Mile Rd. Route 2, Box 144
Royal Oak, Michigan.

FOR SALE

Core Oven, Gehnrich 2 compartment each 4′ wide, 7′ 6″ long, 7′ 6″ high, recirculating gas, 4″ insulation, portable. Each compartment has complete burner and circulating unit mounted on top. Outside overall 12′ wide, 9′ 2″ long, 8′ 10″ high, plus 3′ for circulating units. Motors 2 hp, 220 volts, 3 phase, 60 cycle. Price $1500. Cost $2400.

AMERICAN MARINE BRASS FOUNDRY INC.
22 Berriman St., Brooklyn 8, New York

FOR SALE

Immediate delivery one 1000 KVA forty degree rise 3 phase 60 cycles electric furnace transformer for 7200 volt power supply.

BOX 800
The FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

20 Ton Capacity Jolt Molding Machine Manufactured by Herman Pneumatic Machine Co. This machine was purchased by us from the Herman Pneumatic Machine Co. as a thoroughly rebuilt machine in 1939. It cost us $4,800.00. The table top is 7 ft. x 10 ft. The jarring capacity is 45,000 pounds—at 30 lbs. air pressure.

Before we really got to using the machine our work changed so that it has had practically no service since we have owned it. We have foundation drawings.

Price about $1,500.00 F.O.B. Cleveland, Ohio.

FULTON FOUNDRY & MACHINE CO., INC.
EAST 75th ST. & MORGAN AVE.
CLEVELAND 4, OHIO

FOR SALE FAR BELOW VALUE

8 Campbell-Hausfeld stationed furnaces for aluminum, capacity 500 lbs. with all necessary attachments, also heat and metal control equipment on every furnace. Can be used for gas and oil heating and will be sold for $290.00 per furnace. This equipment has been in operation for only three months.

KENT FOUNDRY COMPANY
DIV. OF KENLEE CORP.
CORTLANDT & TERRY STS.
BELLEVILLE 9, N. J.

FOR SALE

New modern cupolas all sizes, shipment 4 to 6 weeks. New #50 or #60 forced draft coke-fired brass furnaces. Used 50 cu. ft. capacity air compressor. Used tumbling barrels. Address: Room 558, 206 Essex St., Boston 11, Mass.

FOR SALE

SPECIAL: (1) Pangborn Roteblast #28, type GK, Barrel 64″ long x 36″ diam. complete with scoop type loading device and abrasive reclaimer, following 220/440-V., 3-PH., 60-CY. motors and controls, (2)-15-HP., (2)-7½-HP. & 2-2-HP. THIS EQUIPMENT PRACTICALLY NEW OF LATEST DESIGN, STILL ERECTED, AVAILABLE FOR IMMEDIATE INSPECTION & SHIPMENT, WE SUGGEST YOU WIRE OR PHONE FOR OPTION TO COVER INSPECTION.

(2) Practically New Whiting bottom pour Ladles, 17-ton capacity, In Steel each with trunions on square bail for both ladies.

(1) Complete modern Sand Handling, Preparation and Reclaiming System, capacity 20-tons per hour, includes shakeout Hopper, Electric Vibrator, Magnetic Belt Conveyor, Bucket Elevator, Storage Bin, Refuse Bins, Belt Feeder, Jeffery Sand Aerator, Distribution Belt Conveyor & Moulders Hoppers. Beardsley Piper Sand Slinger & Apron Feeder, Jeffrey Electric Vibrator, Dings Magnet with M.G. Set and all necessary motors, (1)-5′x8′ Simplicity Shakeout.

(1)—6′ Simpson Sand Mixer with Bucket Loader.

OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(1)	10/5	Northern	45′0″	220-VAC
(1)	10	Champion	60′0″	550-VAC
(1)	10	Champion	86′0″	220-VAC
(1)	15	Champion	80′0″	550-VAC
(1)	15/5	Northern	86′8″	230-VDC
(1)	15	Shaw	106′8″	230-VDC

SEND FOR OUR STOCK LIST OF A.C. & D.C. MOTORS, GENERAL PURPOSE, CRANE & MILL TYPE.
WE OFFER ONLY EQUIPMENT WE OWN AND CAN MAKE PROMPT SHIPMENT.

T. B. MACCABE CO.
4304 CLARISSA ST.
PHILADELPHIA, PA.

Classified Advertising

For Sale

SURPLUS EQUIPMENT AVAILABLE

ACME-GRIDLEY AUTOMATIC MACHINE

1—Late Model $\frac{8}{16}$" capacity RA6 Acme-Gridley Automatic 2nd Operation Machine. Equipped with 7½ HP, 220V, 60 cycle, G.E. Motor—1st, 2nd and 3rd position form tool holders, 6th position magazine loading attachment and Solenoid Counter. Selling Price—$5265.03.

PANGBORN SAND BLAST

1—#34 type L-1 Semi-Mechanical Blast Cleaning Room Installation, complete with all fans, motors and accessories as described.

10 Pcs.—Part AC-S-1372	5 Pcs.—Part AC-179
3 Pcs.—Part AQ-1-221A	14 Pcs.—Part AC-155
1 Pc. —Part AQ-S-1400D	5 Pcs.—Part AC-178
2 Pcs.—Part AV-4-728A	70 Pcs.—Part P-C-M—New Nozzles
10 Pcs.—Part AQ-1-224	10 Pcs.—Part Glass Light Shields
8 Pcs.—Part DFI-P-17	1 Pc. —Part V-401961-6 Norbide Pressure
1 Pc. —Part 3973D	Nozzle

Selling Price.....$1400.00

READING HARDWARE CORP.

READING, PA.

FOR SALE

27" x 36" American Foundry Equipment Wheelabrator complete with motors and loading skip. Also included is spare flight complete and other miscellaneous spare parts. Excellent condition. Five years old. Price $3,200. Address Box 810 The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: Box 772, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Battery of 4 used rack type core ovens with one combination gas and oil burner mounted on top of oven. Manufactured in 1933 by Fred Hover, Chicago. 32' 2" overall depth, 17' 4" overall height; inside depth 11' 8" (2 racks deep); doors 72" wide x 90" and 102" high. All doors and sheet metal front renewed 8 months ago. In good working order. Used until July 1 when dismantled to make room for continuous horizontal conveyor oven. Photographs furnished upon request. Also 46 well constructed used steel core racks 5' x 5' x 6' high, having 5, 6, 7 and 8 shelves.

GREDE FOUNDRIES INC.

P.O. Box 443, Milwaukee 1, Wis.

Phone "Mitchell 2450"

FOR SALE

Gisholt Turret 3¼" Capacity 18" Swing. Quick return. Very good complete. J and L Turret Saddle type, 3" x 36". Very good complete.
Higley No. 9 undercut cold saw. 21", 9" cap. Complete good condition.

Tumbling Mills. W. W. Sly 60" x 36" x 36". Exhaust type. Inside hardened.

1 48" Sly Mill 28" square. Exhaust type. Inside hardened.

1 cast iron octagon Mill 56" x 24". Ball bearings. Heat treating furnaces. American Rotary Gas furnace. Size 2-B. Carbonizing or Hardening. Oil & Water bath. L & W Controls.

Am. Industrial G. E. Annealing or Hardening Electric Furnace. 1850 Deg Box Type. 30" x 60" x 22". 3 Ph. 60 Cy. 220 Vts. 60 KW.

JAY SALTER

306 ROSEDALE ST.

ROCHESTER 7, N. Y.

FOR SALE

1 Osborn jolt strip molding machine table 32" x 40", width between stripper arms 48" cylinder 6½" diameter, load capacity 1500 lbs. $500 F.O.B. Milwaukee. Address: SCHWAB FURNACE CO., 332 WEST FLORIDA ST., MILWAUKEE, WIS.

FOR SALE

Sand conditioner "The Moulder's Friend", purchased new this year. Original guarantee is still in effect and machine has been used less than two months. 220/440 V, 3 Ph, 60 cycle. New spare rotary brush included.

The HILLSDALE FOUNDRY CO. INC.,
HILLSDALE, MICHIGAN.

FOR SALE

3 Dempsey batch type heat treat furnaces, oil burner and motor operated valves. Good condition, low priced. Also 1 Type LD1 Pangborn table blast. Address: JAMESTOWN MALLEABLE IRON CORP., JAMESTOWN, N. Y.

FOR SALE

One Modern Equipment standard straight sided, Type D, geared lip pour ladle, 4000 pounds capacity steel; 6000 pounds capacity iron. Excellent condition.

The PELTON STEEL CASTING CO.
Milwaukee 7, Wisconsin

FOR SALE

150 various size wood used snap flasks for $500 cash. Address: Box 853, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

BUCKET TYPE EXHAUST FAN COMPLETE with 48" fan, 1½ H.P. Continuous running heavy wound, 490 R.P.M., 220 volts, 60 cycle, 3 phase, 6.7 amp., Self Cooled Motor, and Frame. Address: ATLANTIC BRASS WORKS, INC., 2035 W. HARRISON ST., CHICAGO, ILL.

FOR SALE

Flask bands in good used condition. Available in small lots and various sizes from 10 x 14 to 16 x 16. Write for list and prices—Attention Mr. K. W. Comstock.

GALE MANUFACTURING CO.

Albion, Michigan.

FOR SALE

Three Ton Northern Traveling Crane, Cab Type, 22' wide, 3 motor drive.

ABBOTT SALVAGE CO.

1807 Clinton St., Buffalo 6, N. Y.

We have the following surplus available for sale:

MOTORS AND PUMPS
4—Spencer PS-25 Class L Thermo-Exhausters with 3 HP Westinghouse motors attached 440 V, 1800 RPM, AC, 3 PH.
8—Spencer M1H Class H Thermo-Exhausters with 30 HP Westinghouse motors attached 440 V, 3 PH., AC.
12—Fairbanks, Morse Pumps with 25 HP Fairbanks, Morse motors attached 440 V, 3 PH., AC.
4—Vickers V134 LH Pumps with Westinghouse 20 HP motors attached 440 V, AC, 3 PH.

VALVES
104—Oil Gauges
120—Butterfly Air Valves
80—240-02 Sensitrol Oil Valves
8—Automatic Switch Co. ⅜ x ⅜ type PNVA.
4—Leeds and Northup Valve Motors.
16—Hydraulic, 4-way, double solenoid operating valves.
8—Logansport ¾" and 1¼" valves.
20—W. S. Rockwell—Blast Gates 2", 6", 5" and 8".
8—Connelly "H" valves 2½" x 2".
4—No. 11 Regulators 3".
8—North American Air Valves 6".
48—Marshalltown 2½" diaphragm Gates.

BURNERS
92—North American Oil Burner No. 210.
8—North American Dual Fuel Burners No. 220.
52—North American Oil-Air Ratiotrols.
8—Wheel Co. Flame Eyes.
This is offered subject to prior sale.

CONDENSER SERVICE & ENGINEERING CO., INC.
95 RIVER ST.
HOBOKEN, N. J.

FOR SALE

Oil fired Porbeck recirculating portable mold dryer—1,000,000 B.T.U. capacity, complete with motor and oil burner.

THE A. KILPATRICK SONS FOUNDRY CO.
625 CARRIE AVE.
ST. LOUIS 15, MO.

FOR SALE

Jolt Squeezer Machines
10 #275 Osborn with 10" cylinder
4 Milwaukee with 14" cylinder
1 International rollover type G R size 24 x 12
Also various other sizes of jolt squeeze and pin lift units.

THE BARDES FORGE & FOUNDRY CO.
2619 COLERAIN AVE.
CINCINNATI 14, OHIO

Are **YOU** in need of foundry equipment?
Do **YOU** have equipment to sell?
Are **YOU** looking for experienced men?
Do **YOU** want to obtain a position?
If **"Yes"** is your answer to any of the above questions, may we offer the services of the Classified Advertising Department of The FOUNDRY?

POSITION WANTED
Minimum advertisement set solid, 30 words $1.50. Additional words 5c each.

HELP WANTED
Minimum advertisement set solid 30 words or less $3.00. Additional words 10c each.

FOR SALE
Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

WANTED
Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

Miscellaneous advertisements such as "Personals", "Services" etc., minimum 30 words set solid. $3.00. Additional words 10c each.

Note: If replies are to be sent to a box number in care of The Foundry, add 6 words to your advertisement for box number and address. Any advertisement set in all caps, add 50% to above rates.

Wanted

GRAY IRON CASTINGS INCLUDING MACHINING

FOR DELIVERY SPREAD OVER THE NEXT 6 TO 12 MONTHS

We will furnish complete pattern equipment for the following two groups of castings and invite inquiry from foundries in a position to figure on any part or all of:

GROUP 1—consists of 7 castings ranging in weight from 10 lbs. to 175 lbs. each. Machining is simple, requiring 3′ planer and small radial drill press. *We can use up to fifty tons of castings in this group.*

GROUP 2—consists of 4 castings weighing 800, 750, 480, and 105 lbs. each. Machining requires 3′ vertical boring mill and small radial drill press. *We can use up to thirty tons of castings in this group.*

We are an old, established and progressive business located in the Middle West. Have been the leader in our field for years. Customers include many hundreds of the largest industrial concerns and Public Utilities throughout the United States and Canada. You will find it a pleasure to deal with our personnel.

PLEASE INDICATE WHICH GROUP OF CASTINGS YOU ARE INTERESTED IN FIGURING ON AND WE WILL SEND BLUE PRINTS AND DETAILED SPECIFICATIONS

Address Box 824, THE FOUNDRY
Penton Building, Cleveland 13, Ohio

GOVERNMENT-OWNED SURPLUS

STEEL... at quick sale prices!

STEEL can be bought now through War Assets Administration, for immediate shipment to you. Alloy steel billets, blooms and many items of alloy steel bars, particularly in the larger sizes, are available in Chicago, Cleveland, Detroit and other Regional Offices.

Lowscale prices make it worth your while to buy this high-grade material, even if you intend it for low-cost products.

Carbon and alloy steel mechanical tubing is also available in a wide range of sizes and specifications. Contact your nearest War Assets Administration Office below, or clip and mail the coupon.

FREE INFORMATION

To War Assets Administration:*

Please send me full information, including availability and pricing of the following:

Carbon and Alloy Billets and Blooms ☐—H. R. & C. R. Alloy Sheets ☐—Strip and Plates ☐—Stainless Steel Sheet and Strip ☐—Mechanical Tubing, Carbon and Alloy ☐—Standard Type Valves and Fittings ☐

NAME.....TEL. NO.....

FIRM.....

ADDRESS.....

CITY.....STATE.....

*Send coupon to nearest Regional Office below for fast service.

All steel is subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

EXPORTERS

Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

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MODERNIZE WITH PARSONS DUST ARRESTORS

LOOK NOW!

IS YOUR PLANT EQUIPPED FOR POST-WAR COMPETITION ?

Parsons Oval Bag Dust Arrestors Actually Pay For Themselves

Don't wait! Make your plans today! Post-war competition will be keen, with demands for greater production and working conditions that take into consideration the health of your employees. Foundry dirt and dust deteriorate equipment, slow up production . . . decrease employee efficiency and cause absenteeism. Dirt and dust is an extremely costly element which can definitely be eliminated by Parsons Oval Bag Dust Arrestors. The remarkable improvement in the health, energy and efficiency of employees plus the added production of both men and machinery will prove conclusively that Parsons Oval Bag Dust Arrestors actually pay for themselves. Let our engineers show you foundry installations from coast to coast. Without obligation let us check into your dust problem.

NOTE THESE EXCLUSIVE PARSONS FEATURES

- Long life patented oval filtering bags, installed without the use of tools.
- Non-rusting arrestor case equipped for easy inspection and maintenance.
- V-belt drive and balanced shaker mechanism thoroughly cleans cloth bags.
- Heavy guage steel hoppers fitted with discharge valves. Easily operated... absolutely dust-tight.
- Continuous 24-hr. operation if required.

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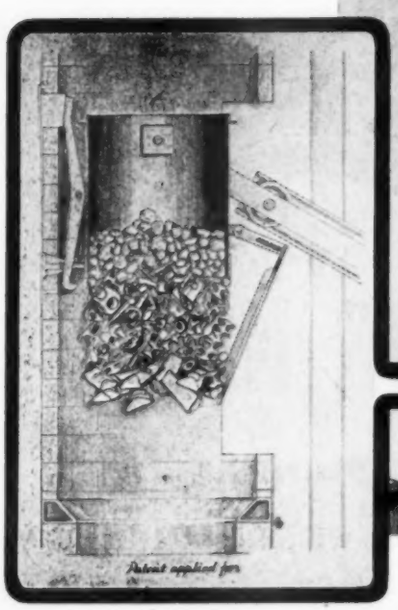
Charging The Modern Way



MODERN drop bottom bucket method of charging is not limited to large daily tonnage operations.

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This system will give you:

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The Best in Melting

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The Trademark of Quality

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"Quality Products and Painstaking Service" . . . there's the keynote to the business policy at STEVENS . . . a veritable "department store" for the foundry industry.

We do not make castings, but, as an organization, Stevens is made up of men who have accumulated a vast amount of knowledge of the equipment and materials that produce them . . . of high quality.

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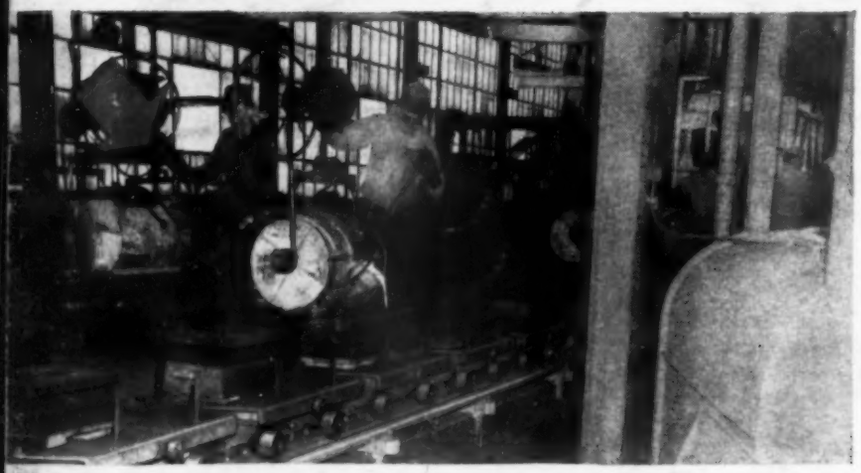

. . . . automatic and continuous mold handling at SIBLEY

The Link-Belt sand preparation equipment consists of a vibrating screen located over a sand storage bin, measuring hoppers, and muller with cooling hood. From the muller the prepared sand is conveyed to a bucket elevator by means of a belt feeder. The bucket elevator discharges the sand into a revivifier which aerates and gives the sand "flowability." A transfer belt conveys the sand to a distributing belt servicing fourteen molders' hoppers.

Sand fills the squeezer molds through the operation of undercut duplex gate controlling the flow of sand from the molders' hoppers. The molder places the mold on a Tru-Trac car-type conveyor. The mold travels through the counting station and weight shifting station, where a cast iron weight is placed on each mold.

The mold conveyor carries the molds to the pouring station, where molten metal is poured from 500-lb. ladles. The mold then travels through a hooded and ventilated enclosure to the weight shifting station, where the cast iron weight is removed. The mold then continues through the hooded enclosure to two vibrating shakeout screens where the molds are dumped from the cars. Two shakeout screens are used in order to keep various classes of castings separated.

The first shakeout screen shakes the molding and core sand loose and tumbles the castings onto a conveyor where the castings are degated. The second shakeout screen degates certain castings, and the castings are discharged into containers while the sprues remain on special fingers attached to the shakeout screen and are manually removed. The molding sand falls through the shakeout screens to a belt feeder below the floor level which carries the sand to an elevator, discharging the sand onto the vibrating screen located above the top of the sand storage bin.

This is continuous molding, efficient use of time, materials and energy. It is also a sound production approach to better employee relations. Consult Link-Belt engineers about a modernization program for your foundry.

10.46

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